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ORIGINAL MEMOIRS.

RESULTS OF ONE THOUSAND OPERATIONS FOR THE RADICAL CURE OF INGUINAL AND FEMORAL HERNIA PERFORMED BETWEEN 1891 AND 1902.¹

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FROM August, 1891, to May 11, 1903, I have operated upon 1075 cases of inguinal and femoral hernia.

Inasmuch as the purpose of this paper is chiefly to determine the permanent results of operation for the radical cure of hernia, I shall not consider the cases that have been operated upon during the last six months. This gives us 1003 cases operated upon during a period of eleven years prior to December, 1902. These cases may be classified as follows:

Inguinal hernia, 937 cases—756 male, 181 female.

Femoral hernia, 66 cases.

Of the inguinal cases there were performed in:

	Male.	Female.
1891.....	8 cases.	2 cases.
1892.....	20 "	2 "
1893.....	46 "	3 "
1894.....	71 "	6 "
1895.....	51 "	18 "

¹ Read before the American Surgical Association at Washington, May 13, 1903.

	Male.	Female
1896.....	50 cases.	20 cases.
1897.....	77 "	19 "
1898.....	71 "	22 "
1899.....	84 "	21 "
1900.....	100 "	30 "
1901.....	79 "	17 "
1902.....	99 "	21 "
	<hr/> 756 "	<hr/> 181 "

As regards the ages of the patients, 538 operations were performed at the Hospital for Ruptured and Crippled upon children varying in age from four to fourteen years. In 465 operations performed elsewhere, chiefly at the Post-Graduate and General Memorial Hospitals, the ages of the patients were as follows:

13 cases.....	1 to 4 years of age.
38 "	4 " 10 " " "
99 "	10 " 20 " " "
177 "	20 " 30 " " "
77 "	30 " 40 " " "
36 "	40 " 50 " " "
19 "	50 " 60 " " "
6 "	60 " 70 " " "
2 "	70 " " " "

Thus it will be seen that a larger proportion of the cases were children than adults. In 317 cases the patient was over twenty years of age (twenty to seventy) and in about 700 under twenty years.

The good results we have had in children at the Hospital for Ruptured and Crippled have frequently been explained on the theory that the radical cure of hernia in children is a much simpler matter than in adults, and that almost any method of operation will suffice. In answer to this argument, I would cite the fact that in twenty operations prior to 1890 in which the Czerny and Socin methods were used, 50 per cent. of relapses occurred within a year of the time of operation. The operation in children is really more difficult than in adults, and needs not only the best method, but the greatest care in

technique to give as good results as in the adult. With the best methods and the greatest care in the performance of the operation, I believe that the results in children are equal to the results in adults.

It will be readily admitted that children and young adults furnish better material for good results than individuals beyond middle life with weak and atrophied muscles. A comparison of my series of cases with the recent statistics of the Vienna Clinic ("End Results in 800 Operations for Hernia after the Method of Bassini in the Albert-Hochenegg Clinic," *Archiv für klinische Chirurgie*, Band lxxviii, Heft 1, 1902) will show a larger proportion of operations in elderly persons in mine.

At the Vienna Clinic, it is stated that 804 radical operations were performed upon 473 patients,—423 male, 50 female,—the ages of which were as follows:

1 to 5 years, 32; 5 to 10 years, 22; 10 to 20 years, 112; 20 to 30 years, 199; 30 to 40 years, 55; 40 to 50 years, 37; 50 to 60 years, 16 cases.

That 804 operations should have been performed upon 473 patients at the Vienna Clinic strikes one as peculiar in the undue proportion of double to single hernias. The explanation appears later in the text, and rests upon the custom that obtained at the Vienna Clinic, prior to 1898, of always operating upon both sides whenever any enlargement could be made out in the external ring of either side. This, as the records show, resulted in a double operation in nearly every case, whether a hernia was actually present or not. Hence the results of their 804 operations cannot be fairly compared with the results of other operators who have followed the usual custom of operating only upon actual rather than potential hernias.

My own list of 1003 operations shows only ninety-two double herniæ, or 911 individual patients operated upon.

As regards the methods employed in the femoral cases, Bassini's method for femoral hernia and the purse-string suture (with kangaroo tendon) were used,—the former in

sixteen, the latter in fifty cases. In the fifty cases operated upon by the purse-string method, there has not been a single relapse.

These cases have been in no way selected, and the purse-string method was employed in every patient, no matter how large the hernia.

Inguinal Hernia in the Female.—One hundred and eighty-one operations were performed for inguinal hernia in the female, with no mortality and without a single relapse. The method employed was practically Bassini's method for the male. The sac was always carefully dissected off from the round ligament (Fig. 1), and the latter was then allowed to drop back in the lower angle of the wound, and to lie beneath the deep layer formed by uniting the internal oblique muscle to Poupart's ligament. The aponeurosis is then closed over this deep layer with a continuous suture of kangaroo tendon and the skin with interrupted catgut. That the more complicated technique of cutting up the internal oblique and transplanting the round ligament into the upper angle of the incision, employed by Bloodgood and Kelly, and practically an application of the original Halsted operation for the male to the female, is unnecessary, is proven by the perfect results obtained by the simpler technique described. This operation can be easily performed in from ten to twelve minutes, and I have done it in eight minutes.

Including the cases operated upon from January, 1903, to April, 1903, I have operated upon 200 cases of inguinal hernia in the female, without mortality and without any relapses. This I believe is the largest number of this variety of hernia that has been reported. At the Vienna Clinic, Goldsen reports only seventy-one cases of inguinal in the female, with three relapses, and Championnière has reported seventy cases, with three relapses. Championnière removes the round ligament with the sac. This undoubtedly renders the operation much easier, yet, with a little care, the sac may be dissected off and the ligament preserved (Fig. 2).

Femoral Hernia.—In this group are sixty-seven cases

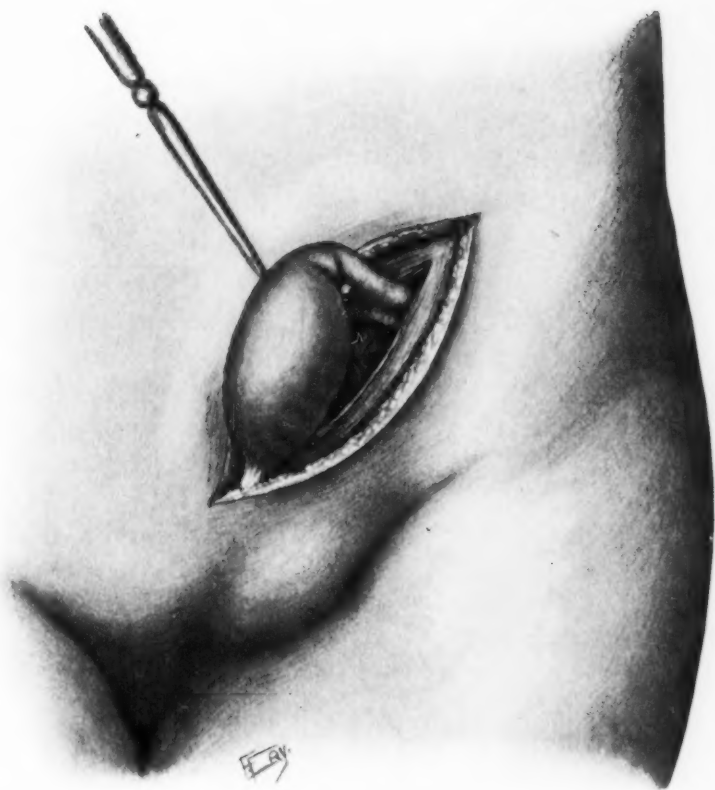


FIG. 1.—Inguinal hernia in female. Sac unopened.

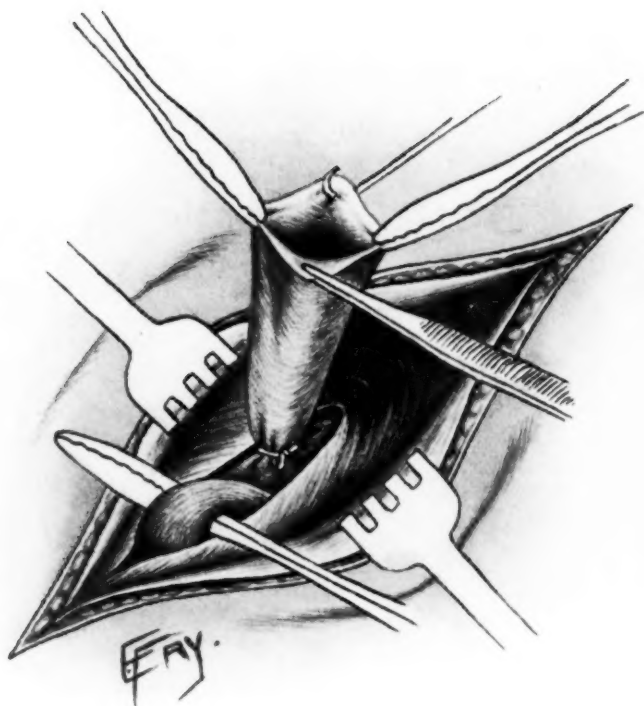


FIG. 2.—Inguinal hernia in female, showing sac dissected from round ligament.

operated upon from 1892 to 1902, with the following results: There was no mortality, and primary union was obtained in all but one case. This case furnished the only relapse that has been observed.

The patient, a woman aged thirty-five years, was operated upon in 1896 by Bassini's method for femoral hernia. At the end of one and one-half years there was a slight relapse, for which a truss was worn for a short time and then discarded. Five years later she wore no truss, and there was little more than an exaggerated impulse.

The other cases have remained sound, and all but eight have been traced, as follows:

Well from 10 to 11 years.....	1 case.
" " 8 to 9 "	4 cases.
" " 7 to 8 "	2 "
" " 6 to 7 "	1 case.
" " 5 to 6 "	7 cases.
" " 4 to 5 "	3 "
" " 3 to 4 "	2 "
" " 2 to 3 "	14 "
" " 1 to 2 "	12 "
" " 6 months to 1 year.....	3 "
" less than 6 months.....	7 "
Not traced	9 "
Relapsed	1 case.
Total	66 cases.

Thus it will be seen that forty-six were well from one to ten years and thirty-four from two to ten years after operation.

Direct Hernia.—Fourteen operations upon nine patients were performed for direct inguinal hernia. This is about the same proportion as shown in Goldner's statistics, twelve cases in 804 operations. In most cases I transplanted the cord by Bassini's method; but the very conditions that make it possible for a direct hernia to occur, viz., an abnormally poor development of the internal oblique muscle, make it difficult to effect a satisfactory closure of the opening by any method. This is

the class of cases in which Bloodgood finds "obliteration of the conjoined tendon," and advises utilizing the rectus muscle in closing the opening. As far as I have been able to trace the results, there has been but one recurrence in these fourteen operations for direct hernia.

END RESULTS IN 1003 CASES OF INGUINAL AND FEMORAL
HERNIA OPERATED UPON FROM AUGUST, 1901, TO
DECEMBER 31, 1902.

Of 937 cases of inguinal hernia the cord was transplanted according to Bassini's method with kangaroo tendon for the buried sutures in 917 cases, with ten relapses, or a fraction over 1 per cent.* Of these cases 181 were inguinal herniæ in the female, without a single relapse. In twenty cases in which the cord was not transplanted, six relapses have been observed. This does not give a fair idea of the relative value of the method of not transplanting the cord, for the reason that in several of the cases it was used in sliding hernia of the cæcum, a variety of hernia very difficult to cure by any method.

In sixty-six cases of femoral hernia there was one relapse, which was so slight that five years afterwards there was only a slight impulse that did not need a truss.

The purse-string method, originally described, I think, by Dr. H. L. Cushing, of Boston, was used in fifty cases with no relapse, and the Bassini method for femoral hernia in sixteen cases with one relapse.

End Results in Detail.—In the entire series of cases, 1003 in number, the end results were as follows:

Six hundred and forty-seven were traced and found well from one to eleven years; 705 cases were well from six months to eleven years; 460 were well from two to eleven years. The duration of observation in these cases was as follows:

* Since writing this paper, I have found one more relapse occurring in a large direct hernia, making the total number of relapses, after Bassini method, eleven.

Sound over 11 years.....	1 case.
" from 10 to 11 years.....	6 cases.
" " 9 to 10 "	12 "
" " 8 to 9 "	22 "
" " 7 to 8 "	19 "
" " 6 to 7 "	29 "
" " 5 to 6 "	48 "
" " 4 to 5 "	76 "
" " 3 to 4 "	97 "
" " 2 to 3 "	158 "
" " 1 to 2 "	187 "
" " 6 months to 1 year.....	58 "
Total	705 "

In comparing these results with recent statistics, it will be seen that the period of observation is considerably longer.

The statistics of the Johns Hopkins Hospital (Bloodgood, *loc. cit.*) show that of 268 cases operated upon by the Halsted method, only nine cases were traced more than six years, and only 124 were traced beyond one year.

The recent statistics at Czerny's Clinic (*Beiträge zur klinischen Chirurgie*, Band xxxiv, 1902, page 450) show that of 107 Bassini operations, nine cases only were well over six years and 106 cases over two years.

The statistics of the Vienna Clinic (Albert and Hochenegg) reported by Goldner (*Archiv für klinische Chirurgie*, Band lxxviii, No. 1, 1902) show that of 804 Bassini operations performed from March, 1895, to December, 1899, no cases were traced beyond six and one-half years; twenty-six were well from six to six and one-half years, and 434 from two to six and one-half years.

At the Vienna Clinic, thirty-one relapses were observed in 701 operations for inguinal hernia in the male, and four in seventy-one inguinal hernia in the female, or $7\frac{1}{2}$ per cent. Of fifty-eight cases of children, between the ages of one to ten years, there was one relapse.

The Johns Hopkins statistics (*loc. cit.*) show that in 268 cases operated upon by the Halsted method, there were six relapses and four others in which there was slight weakness in

the scar. Of thirty-nine cases of inguinal hernia in the female, there was one relapse. This gives 307 cases of inguinal hernia with seven relapses, or, including the four cases of weak cicatrices as relapses (which was done in Goldner's statistics as well as my own), eleven relapses, or 3.6 per cent.

As I have stated, the results at the Vienna Clinic cannot fairly be cited in comparison with other statistics, for the reason that they include a very large number of operations in which no hernia was present. Eight hundred and four operations were performed upon 473 patients. My own statistics show 1003 operations upon 911 patients, giving a double operation in only ninety-two patients, and then only when a hernia was actually present. Up to the end of 1898, or all except one year of the entire period covered by the Vienna statistics, it was the custom to operate on both sides "in all cases in which there was a widening of the external ring." The reason for this procedure was the fear that a hernia would develop on the other side, but the after-examination of fifty-two cases operated on unilaterally showing only four cases of hernia on the opposite side, the double operation was abandoned in 1899, except in cases in which a double hernia was present.

In order to estimate the percentage of radical cures after operation, it is necessary to know the period of time that must elapse before the hernia can reasonably be considered cured.

In former papers I have stated that by far the greatest proportion of relapses occur within the first year after operation, and that most of them occur within the first six months. This opinion was based on an analysis of 365 cases of relapsed hernia observed in the out-door department of the Hospital for Ruptured and Crippled and operated upon by various methods. This series of cases showed that 85 per cent. of the relapses occurred within the first year following operation, and that 65 per cent. occurred within the first six months. I have recently, with the help of Dr. George C. Warren, late House Surgeon of the Hospital for Ruptured and Crippled, made a study of 165 new cases of relapse observed since the previous statistics were compiled. This series shows that in twenty-

six cases the interval between operation and relapse was not definitely known, leaving 139 cases as a basis of calculation. It was found that ninety-one, or 65 per cent., relapsed within the first six months, and 111, or 80 per cent., within the first year after operation. Thirteen and two-thirds per cent. occurred from one to two years after operation, and only 6 $\frac{2}{3}$ per cent. occurred after two years had elapsed.

These new statistics quite confirm the conclusion drawn from the earlier cases, and prove that patients well one year after operation may reasonably be expected to remain well, and that after two years they may be considered permanently cured.

A Study of the Relapsed Cases.—An analysis of the relapsed cases shows that Bassini's operation had been performed in ten cases, which, in 917 Bassini operations, gives slightly more than 1 per cent. of relapses after this method. There has been one relapse in femoral and six relapses in twenty cases of inguinal hernia in which the cord was not transplanted. Looking into the cases individually, we find a special reason for the relapse in most instances. The Bassini relapses were as follows:

CASE I.—C. R., aged thirteen years. Very large, right inguinal hernia, the size of a fist. Operation, December 28, 1891. Silk used for buried sutures. This was one of the first cases in which I had employed Bassini's method; the technique was far from perfect, the dissection difficult, and operation prolonged. The wound suppurated badly and most of the silk sutures were extruded. Relapse occurred within three months.

CASE II.—I. M., aged seventeen years, was operated upon for large right inguinal hernia on May 25, 1894. Primary wound healing; remained well for over four years. Did hard riding as a cavalryman in army in Spanish-American war; contracted typhoid fever and lost over fifty pounds in weight; relapse occurred on getting up from typhoid in weakened, emaciated condition. I again operated on April 30, 1901, by Bassini's method, but a slight relapse occurred six months later.

CASE III.—A. B., aged thirty-five years, butcher, operated

upon for large inguinoperineal hernia, July 1, 1896. Primary wound healing. Patient had a large abdomen with a good deal of fat in abdominal wall. Occupation required heavy lifting. Very slight relapse (size of a pigeon's egg) one year later. Truss worn for a short time. Examination four years later showed only exaggerated impulse on coughing.

CASE IV.—O. S., aged twenty-three years. Large R. O. I. H. Operation, September 7, 1898. Prolonged, deep suppuration (*staphylococcus pyogenes*), with giving way of aponeurotic layer of suture. Relapsed one and one-half years later.

CASE V.—P. M., aged twenty years. Operation, February, 1895. Primary wound healing. Remained well for two and one-half years, when he received a severe kick in the groin, over cicatrix of hernia wound, during a fight. A protrusion was noticed almost immediately afterwards. The relapse was slight and did not enter scrotum.

CASE VI.—J. B., aged twenty-seven years. Large right inguinal hernia, eight years' duration, with adherent, irreducible omentum. Operation, July 1, 1897. Bassini; kangaroo tendon; primary wound healing. Very slight relapse fifteen months after operation.

CASE VII.—F. N., aged fifty-seven years. Right direct inguinal hernia with large opening and very poorly developed internal oblique muscles. Cord transplanted, but closure of canal unsatisfactory. Primary wound healing. Patient developed albuminuria shortly after operation, and general condition became much below par. Slight relapse followed about three months after operation and truss was applied.

CASE VIII.—I. G. R., aged forty-nine years. Left oblique inguinal-scrotal hernia. Operation, February 7, 1900. Primary wound healing. Relapse the size of an egg, just outside external ring, two years after operation.

CASE IX.—I. W., aged nine years. Double inguinal hernia, complicated with double reducible hydrocele. Operation, August 7, 1894. Double Bassini operation, kangaroo tendon. Primary wound healing. Eleven months later, relapse, the size of a marble, on right side; truss applied. March, 1898, no sign of relapse. March, 1903, slight protrusion.

RELAPSES IN CASES IN WHICH THE CORD WAS NOT
TRANSPLANTED.

CASE I.—W. I. S., aged twenty-nine years. Double inguinal hernia, scrotal. Operation, September 5, 1891, at Post-Graduate Hospital. Bassini's method was used on right side and the cord was not transplanted on the left side. Silk was used for buried sutures. The wound healed by primary union. The rupture remained cured for nine years, when the left side relapsed. I operated on side again, April 24, 1901, at the General Memorial Hospital. The right side (Bassini) was still perfectly sound nine and one-half years after operation, and remains sound at present,—more than eleven years.

CASE II.—V. S., aged nine years. Right inguinal hernia of four years' duration. Truss treatment inefficient. Operation at the Hospital for Ruptured and Crippled in January, 1892. Suture of canal without transplanting cord. *Buried silk sutures.* Wound healed apparently by primary union; but about two weeks later a small sinus was found and some of the buried sutures were extruded. Relapse three months after operation. Second operation by Bassini's method with kangaroo tendon in July, 1902. Patient perfectly sound ten years later.

CASE III.—F. H., aged ten years. Left inguinal hernia, congenital, complicated with hydrocele of cord. Operation, February 15, 1892. Suture of canal with chromicized catgut. Cord not transplanted. Primary wound healing. Slight relapse in canal three and one-half years after operation. Second operation, October 4, 1895. Bassini's method, kangaroo tendon. Slight stitch-hole abscess. Patient has remained well since last operation.

CASE IV.—H. O., aged eight years. Right oblique, inguinal hernia. Operation at the Hospital for Ruptured and Crippled, December 12, 1891. Suture of canal with catgut. Cord not transplanted. Primary wound healing. Slight relapse three months after operation. Patient wore a truss for a short time, and examination, November 18, 1895, four years later, showed the hernia practically cured, only an impulse on coughing remaining.

CASE V.—C. H., aged thirty years. Sliding cæcal and appendicular hernia, large scrotal. The hernia had existed since infancy, and could not be held by truss. Operation, July 22, 1900. The patient had previously been under the "Miller Injection"

treatment, and had had fifteen injections of irritating fluid made into the tissues about the sac. The cæcum, appendix, and a large mass of irreducible and highly vascular omentum were found in the sac. The omentum and appendix were excised and the sac sutured as well as is possible in a sliding hernia of the cæcum. The posterior portion of the cæcum was devoid of peritoneal covering. The cæcum was pushed back and the canal sutured with kangaroo tendon without transplanting the cord. The wound healed by primary union, and the patient left the hospital in three weeks. The hernia relapsed about three months after operation.

CASE VI.—H. D., aged four years. Right inguinal, large cæcal sliding hernia. First operation at the New York Hospital six months before; wound suppurated badly and healed by granulation. Recurrence soon after leaving hospital. The cæcum had slid down into the scrotum. Dissection very difficult. No distinct sac. Closure of canal very unsatisfactory. Slight relapse follows six months later.

Technique Employed.—In operations for inguinal hernia in the male, I have tried to follow Bassini's technique as closely as possible, except that I have substituted an absorbable suture for silk. I have also in nearly every case placed a suture above the cord to prevent any widening of the new internal ring in an upward direction. After the sac has been tied off well beyond the neck, at a point where it has begun to widen out into the general peritoneal cavity, the deep layer of sutures is placed as follows: With a small tape the cord is help up and the first suture is placed so that it just touches the lower border of the cord when the latter is brought vertically to the plane of the abdomen; three to four more through the internal oblique and Poupart's ligament will suffice to close the canal to the symphysis pubis. Then the suture above the cord (Fig. 3) is inserted. This is not a part of Bassini's technique, but I believe it is of decided aid in preventing a relapse, as it strengthens the only weak point in the operation. The incision in the aponeurosis is then closed from above downward by a small continuous suture of kangaroo tendon and the skin with catgut. No drainage is used, and the wound is dressed very

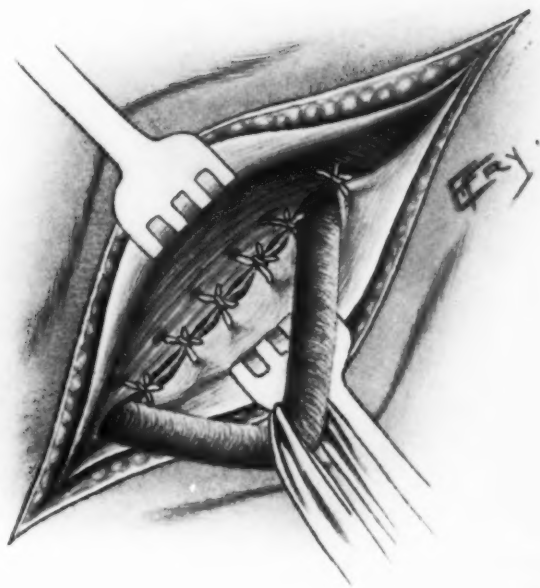


FIG. 3.—Bassini's operation (deep sutures), showing extra suture above the cord.

carefully with 10 per cent. iodoform gauze and, lastly, dry gauze and cotton and spica bandage. A plaster spica is used in children under fourteen years of age. The wound is dressed the seventh day, and the patients are kept in bed two weeks and allowed to go out in two and one-half to three weeks, wearing a spica bandage until four weeks have elapsed, after which no support is worn.

Suture Material.—I have long been a firm believer in the superiority of absorbable to non-absorbable sutures in operations for the radical cure of hernia. I have already in former papers called attention to the disadvantages of silk, silver wire, and silkworm gut, and I will state that increased experience confirms the opinion that these disadvantages are very real. It is true that, under strict aseptic conditions and perfect technique, non-absorbable sutures seldom cause trouble, yet that they do cause trouble in a certain proportion of cases is a demonstrated fact. The late sinus formation with or without extrusion of the sutures tends to weaken the canal and predisposes to relapse. Catgut was used by Czerny in hernia operations prior to 1880, but was soon given up for silk, for the reason that it was believed impossible to perfectly sterilize catgut. By modern methods of sterilization, catgut and kangaroo tendon can be rendered absolutely sterile, and hence the only real objection to their use has ceased to exist. Yet, we find the old prejudice against them still existing almost universally in Europe and very generally in this country. Silk is still used by Bassini for buried sutures and also at the Vienna Clinic, as seen from the statistics referred to.

Silk, silver wire, and recently silk again, have been used at the John Hopkins Hospital.

In proof of the opinion that a large proportion of the cases of suppuration formerly attributed to catgut or imperfectly sterilized buried sutures was really due to other causes, chiefly to infection by the hands of the operator or assistants, it is only necessary to compare the results of wound healing before and after the use of rubber gloves.

Of 116 cases operated on at the Johns Hopkins Hospital

prior to 1896, when gloves were not worn, there were twenty-eight suppurations (24.13 per cent.). Of 104 cases closed with silver wire (without gloves) there were ten cases of suppuration or 9.6 per cent.; while in 226 cases closed with silver wire, with gloves, there were only four cases of suppuration, 1.7 per cent. It may be taken for granted that the suture material, both silk and silver wire in these cases, was always sterile, and that the main causes for the great improvement were due to the use of the rubber gloves.

That improved technique and greater facility in performing the operation may alone cause marked improvement in wound healing, the statistics of the Vienna Clinic prove. While the average percentage of suppuration in the 804 operations was 14.5 per cent., the percentage in 1895 (when the operation was first done) was 18 per cent., while in 1899, without gloves and with the same sutures (silk), the percentage of suppuration was only 5.8 per cent.

That quite as perfect wound healing may be obtained with absorbable sutures and ligatures (kangaroo tendon and catgut) as has ever been obtained with silk or even silver wire, my own statistics prove.

The sutures used have been prepared by Van Horn & Co., of New York, originally by boiling in alcohol under pressure, and the last six years by the Cumol method, and preserved in absolute alcohol. The kangaroo tendon is chromicized just sufficiently to remain unabsorbed for about four weeks, but not long enough to cause the suture to act as an irritating foreign body and produce sinuses.

Rapidity in operating, clean dissection, especially in the separation of the sac from the cord, without bruising the tissues or allowing them to become infiltrated with blood, are also important factors in securing primary wound healing. This is well shown by two operations performed by one of my house surgeons. Though rubber gloves were worn by himself as well as his assistants, because of difficulties with the sac the operation was prolonged, and the tissues were bruised and blood-stained. Both wounds suppurred.

Wound Healing, Personal Cases.—In 1003 operations for inguinal and femoral hernia, in thirty cases there was suppuration. In twenty-one this was limited to stitch-hole abscess, and in nine cases there was deep suppuration. Prior to March, 1899, when I began to use rubber gloves for my assistants and gloves or cots for myself, there were twenty-five cases of suppuration, or 4.2 per cent. Since the use of rubber gloves there have been only five cases of suppuration (one deep and four superficial) in four years, in about 400 cases, or $1\frac{1}{4}$ per cent.

An analysis of the cases of suppuration shows that twenty occurred in 700 cases under the age of twenty and ten occurred in 300 cases over the age of twenty, thus giving practically the same percentage of primary union in the children as in the adults. The largest number of cases in which suppuration occurred were observed in the year 1898, while since November, 1900, I have operated upon 170 cases of adults without a single case of suppuration.

Indication for Operation.—There are certain general rules that have been observed as a guide to operation in the cases reported:

1. *Operation for Hernia in Children.*—Operation is seldom advised under the age of four years except in strangulated cases. The reason for this rule is that many of these cases, probably two-thirds, are cured by a truss. After the age of four years, in all cases in which a truss has been tried and failed, or cases in which the presence of reducible hydrocele prevents a truss from holding the rupture, operation is advised. The same rules hold good in irreducible omentum, a rare condition in childhood.

2. *Operation for Hernia in Adults.*—In all adult cases under the age of fifty years, unless there are strong contraindications present, operation is advised. Between the age of fifty and seventy years operation is advised in patients in good health, in cases in which the rupture is held with difficulty by a truss.

Among contraindications to operation I would mention (1) serious organic trouble of the heart, lungs, or kidneys;

(2) very large, adherent, irreducible hernia in stout individuals, especially when the sac contains both intestine and omentum.

I believe the risks of operation in such cases are large and the chances of a permanent cure small.

When omentum alone is present, the danger is less, but is still enough to be worthy of consideration. I have operated in a single month upon three patients, all weighing 240 to 250 pounds, with irreducible omentum necessitating resection of large masses. All healed by primary union without drainage, yet one case, a man fifty-five years of age, in which a very large mass of omentum had been removed, illustrates the dangers attending operation under these conditions.

Two weeks after perfect primary union, a tender, painful area developed near the umbilicus, and the pulse and temperature began to rise. This continued for a week. Temperature, 99.5° F., A.M., and 101° to 102° F., P.M., and the leucocytic count rose to 20,400. An incision was made under ether on the tenth day after the trouble was first noticed, and the omental stump was found firmly adherent to the anterior parietal peritoneum. On cutting into the inflamed omentum about three-fourths of an inch, an abscess the size of an egg was found and evacuated. Free drainage was established and the wound slowly healed by granulation. If the condition had not been recognized and dealt with at the proper time (neither too early nor too late), peritonitis would probably have ensued.

There has been one death observed in the New York Hospital from the rupture of an abscess in omental stump (tied off *en masse* with silk), and Dr. Bull has reported three cases of well-marked inflammatory swelling in abdomen following ligature of omentum *en masse*, but in no case was there abscess formation. In my own case the omentum was tied off in small masses with catgut, and the greatest care was exercised. I believe the suppuration due to fatty necrosis of the stump, which, in a person of more vigorous vitality, would have caused no trouble. Gloves were worn by the operator and assistants.

Mortality.—There have been two deaths in my series of

1003 cases, or up to May 11, 1903, two deaths in 1075 cases, a mortality of less than one-fifth of one per cent.

My first death (111th case) was due to ether pneumonia in a child aged six years. The second death, February, 1898, was in an adult with large irreducible omental hernia. The omentum was returned instead of being excised (as is my custom when down for any length of time and difficult to reduce). The patient developed intestinal obstruction, whether due to a volvulus or to a slowly progressing peritonitis, could not be ascertained, and died on the sixth day in spite of a second operation. Since that time over 500 operations were performed without a death. The mortality of operations for the radical cure of hernia has been steadily reduced during the past decade. Prior to 1890 it was not far from 6 per cent., which showed sufficient risk to make one hesitate to advise operation as a routine measure.

At the Vienna Clinic there were only three deaths in 804 operations,—one in narcosis, two others, eleven and fourteen days respectively, after operation. One was due to pulmonary embolism, the other to embolism associated with varicosities in the subcutaneous connective tissue of the right thigh, with formation of thrombi in the varices.

At the Johns Hopkins there was but one death in 459 cases, and at Carle's Clinic in Rome there were but two deaths in 1400 operations upon 1285 patients, one from pneumonia on the seventh day of operation.

These statistics prove that the risk of operation for hernia at present (at least in skilled hands) is practically *nil*, and certainly less than the risks of strangulation, even with a hernia apparently well held by a truss.

SPECIAL VARIETIES.

Hernia associated with Undescended Testis.—In 49,859 cases of hernia observed at the Hospital for Ruptured and Crippled from 1891 to 1902, there were 400 cases of hernia with undescended testis.

Personally, I have operated upon thirty-eight patients with hernia associated with undescended testis.

The age of these patients ranged between four and thirty years. Twenty-seven were under fourteen years and eleven between fifteen and thirty years of age.

In only one case did I find it necessary or did I deem it wise to remove the testis. This was in the case of an adult aged twenty-three years. The testis was entirely within the abdominal cavity when the patient was lying down, yet on standing or coughing the testis could be forced into the canal.

Operation showed this peculiar, and in my experience unique, condition (Fig. 4).

A well developed hernial sac extended into the scrotum, and yet the testis could not be drawn down as far as the external ring, even with strong traction. The large cord with dilated veins projected fully two inches below the testis. This condition has been recently described by W. McAdam Eccles in his admirable and exhaustive lectures on "The Imperfectly Descended Testis" (*Lancet*, March 1 and 15, 1902). He states that "The explanation of the scrotal protrusion lies in the fact that a pouch of peritoneum is so frequently drawn down by the gubernaculum testis into the region of the scrotum beyond the site of the arrested organ."

The proper method of treating hernia associated with undescended testis is a question that is still unsettled. Some authorities advise removal of the organ on the ground that it is functionally of no value. Bloodgood's statistics of 459 cases of hernia operated upon at the Johns Hopkins Hospital, between 1889 and 1899, show that the cord was excised in twenty cases, and that in twenty-seven other cases castration with excision of both testis and cord was performed. The excision of the cord was done deliberately in fifteen cases,—in thirteen in men over fifty years of age and in three cases because the cord was accidentally cut during the operation. Castration was further performed in two children on account of injury to cord and in eight other cases on account of undescended testis with hernia. Double castration was per-

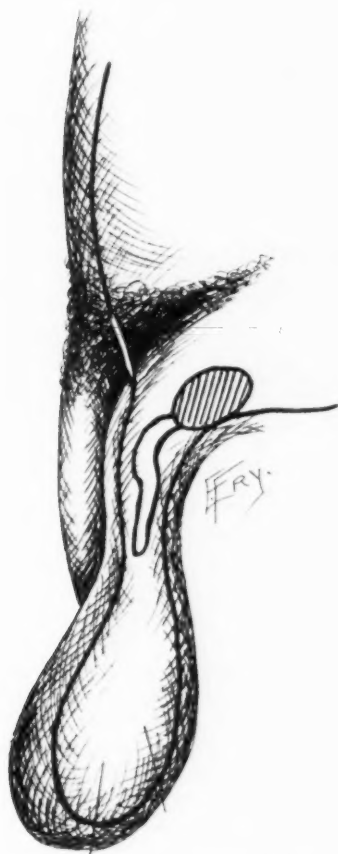
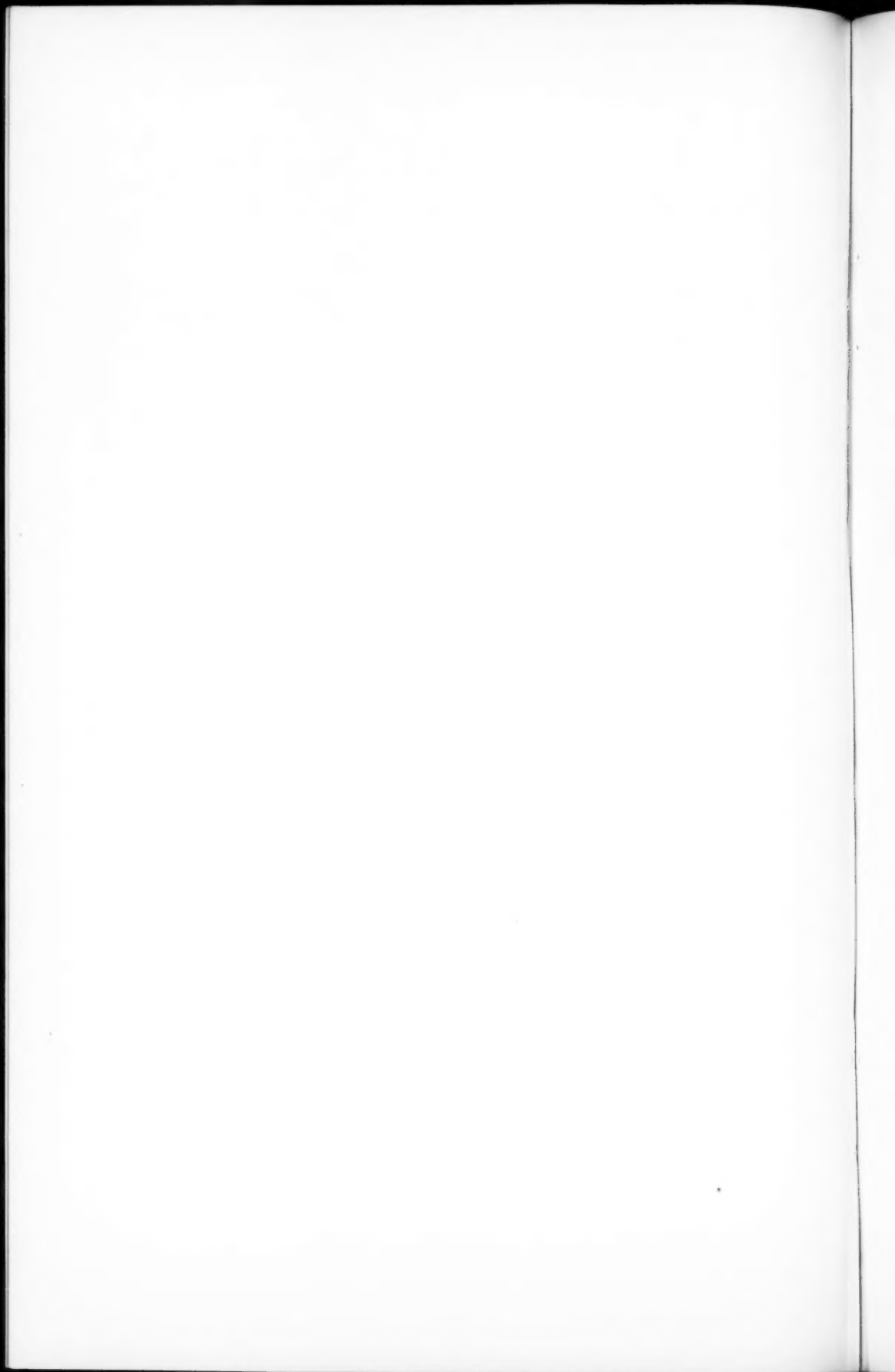


FIG. 4.—Congenital sac extending to bottom of scrotum, with testis within external ring.



formed only in one case in a man with double hernia associated with undescended testes. It is stated that the testes were functionless.

Bloodgood states that Dr. Halsted believes that these undeveloped testes are important in the economy of the male and should be preserved.

In cases of markedly atrophied testis, castration is never done at the Vienna Clinic, as experience has taught that an undeveloped testis, if fixed in the scrotum before puberty, may yet develop to its normal state.

Kraske performed castration in two cases in which the hernial sac could be isolated with difficulty only from the cord. Later, he justified his view by stating that where force is necessary to isolate the cord from the sac, necrosis of the scrotum will ensue.

Broca observed seventy-nine cases of orchidopexy from one to six years after operation. In one case he had to perform castration on account of continual pain; in thirteen atrophy set in; in one it was pretty certain that a recurrence had occurred; the remaining sixty-four developed normally.

Franz considers castration indicated only in cases of distinct atrophy. He reports three cases of castration in connection with radical operation for hernia. In one of these cases, semicastration for atrophy was done together with radical operation; in the second case, semicastration was performed, as the hernia had relapsed and the testis originally fixed to the perineum had become loose again. In the third case, Bassini's operation was performed with semicastration for periorchitis proliferans.

Eccles's careful study of this question (*loc. cit.*) strongly supports this opinion. His conclusions are "that whereas there may be found in the testis two distinct types of cells, the first needed for the formation of spermatozoa and the other probably, though it cannot be positively affirmed, required for the production of an internal secretion, failure in the development of both these types of cells will, as a rule, lead to failure in the proper bodily growth of the individual; but the develop-

ment of the interstitial cells, even though there are no sperm elements, will allow the possessor to become virile while remaining sterile."

Believing in the physiological value of even an atrophied and probably functionless testis, I have made it a practice always to preserve the organ, and have never removed it except on two occasions,—the one already referred to, and the other a small and greatly atrophied testis situated in the perineum and associated with a very large *inguinoperineal* hernia the size of a cocoanut. In both cases the patients were adults, and in both the other testis was fully developed.

I do not believe it wise to operate on the majority of herniæ with undescended testis in children under ten years of age, for the reason that in many cases, as the boy approaches puberty, the testis descends into the scrotum spontaneously. Formerly, I attempted to anchor the testis into the scrotum by various methods, but in recent years have abandoned such attempts. The testis can almost always be drawn outside the external ring, and if the canal is then closed by Bassini's method, the testis will not be able to get back into the canal, and in a fair proportion of cases it will later find its way to the scrotum. I have not observed a single recurrence of the hernia in these cases.

As to the danger of injuring the cord during operation, this can be avoided with reasonable care. I have never as yet met with this accident. The risk is much greater in children than in adults, as the vas is so small and delicate that it may be easily torn.

In discussing hernia associated with undescended testis, we may consider two rare varieties that owe their origin to maldescent of the testis. These are *Inguinoperineal Hernia* and *Inguinosuperficial Hernia*.

Inguinoperineal, or "superficial perineal," *Hernia*, as Küster and Eccles prefer to call it, to distinguish it from a hernia through the pelvic outlet. Its etiology is best explained by the presence of accessory fibres of the gubernaculum testis, which pass into the perineum and there terminate instead of at the bottom of the scrotum, as is usually the case.

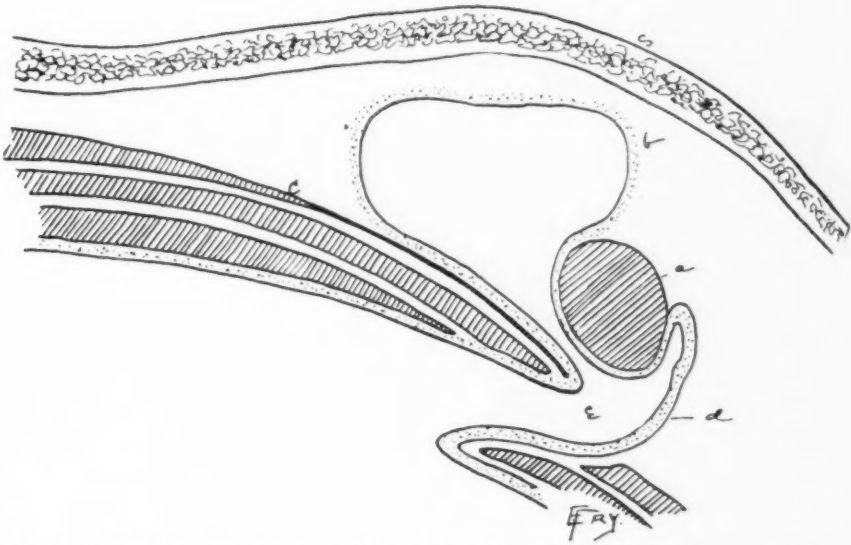


FIG. 5.—Inguinal superficial hernia. *a*, Testis; *b*, hernial sac; *c*, aponeurosis of external oblique; *d*, cord; *e*, external ring; *s*, skin.



This is one of the rarest varieties of hernia. Küster, in 1887 (*Archiv für klinische Chirurgie*, Band xxxiv, page 216), was able to find but three cases in the literature, and one of these was doubtful. In only one of these was an operation performed. It is always associated with perineal ectopia of the testis, itself extremely rare. Küster found only twenty instances of this condition in literature.

I have observed eight cases of testis in the perineum, and in six the condition was associated with a hernia. On five of these patients I operated for the cure of the hernia. The sac was in every case congenital, and in four instances I retained enough of the sac to cover the testis and placed the organ in a new pouch made in the empty scrotum; in three cases the testis remained in the scrotum, but in one it came out and slipped back into the anterior portion of the perineum. In one case only did I remove the testis, my first case, with a hernia the size of a cocoanut and a small atrophied testis at the bottom of the sac.

Superficial Inguinal Hernia, or hernia superficialis inguinalis, is characterized by the German writers. This is really a variety of interstitial hernia, and is so described by Macready and also by Eccles. Moschcowitz has recently described this variety (*Medical Record*, January 10, 1903) and reported a case. He states that only fifteen cases have been reported. That this variety is not nearly so rare as these figures would lead us to believe, my own statistics show.

I have operated upon five cases,—two in adults and three in children. The distinctive feature of the condition is that the sac and testis lie outside of and directly upon the aponeurosis of the external oblique muscle and just beneath the skin (Fig. 5). The origin of this form of hernia is probably due to the fact that the fibres of gubernaculum testis that usually terminate in the scrotum are absent or poorly developed, and the testis, having been pushed out of the narrow external ring by the hernia behind, meeting an obstruction to further progress downward, turns upward along the line of least resistance and rests upon the aponeurosis.

CASES OF INGUINOSUPERFICIAL HERNIA.

CASES I, II. *Double Superficial Inguinal Hernia*.—O. H., male, aged ten years. Testis never in scrotum. Had swelling in both inguinal regions for several years. Operation at the Hospital for Ruptured and Crippled, March 20, 1902, both sides. On both sides the sac and testis were found just beneath the skin and superficial fascia, resting upon the aponeurosis of the external oblique muscle. The testis occupied a position one and one-half to two inches above the external ring. The rings were rather small and the testis could not be reduced into the canals. A typical Bassini operation was performed, and the cord was of sufficient length on both sides to permit the testis to be brought into the bottom of the scrotum, when a pouch was made with the finger to receive them. The patient was examined six months later and the testis remained in the scrotum.

CASE III.—H. V. W., male, aged thirty years, a physician. Had never seen left testis in scrotum. He had observed a swelling in left groin, for which he had tried to wear a truss, but it was always so painful that he had been obliged to take it off. Operation, June 25, 1902. My notes of operation state that "testis and sac, emerging from the external ring, have turned upward and rest upon the aponeurosis of the external oblique." The testis was brought into the scrotum. The wound was closed by Bassini's method; primary union followed, but the patient has not been traced.

CASE IV.—S. S., male, aged twenty years. Double inguinal hernia with left undescended testis. The testis on the left side had never been in scrotum, but there had been a swelling in the inguinal region for some years. Had never worn a truss. Operation at the General Memorial Hospital, October 15, 1902. The testis with a large hernial sac was found one and one-half inches above the external ring and lying upon the external oblique aponeurosis.

Hernia of the Cæcum, Appendix, and Sigmoid.—Thirty-seven cases of these varieties were observed. Of these the cæcum was found alone in ten cases, the appendix was found in sixteen cases, the sigmoid was found in three cases (one strangulated), and in eight cases there was a sliding hernia of the

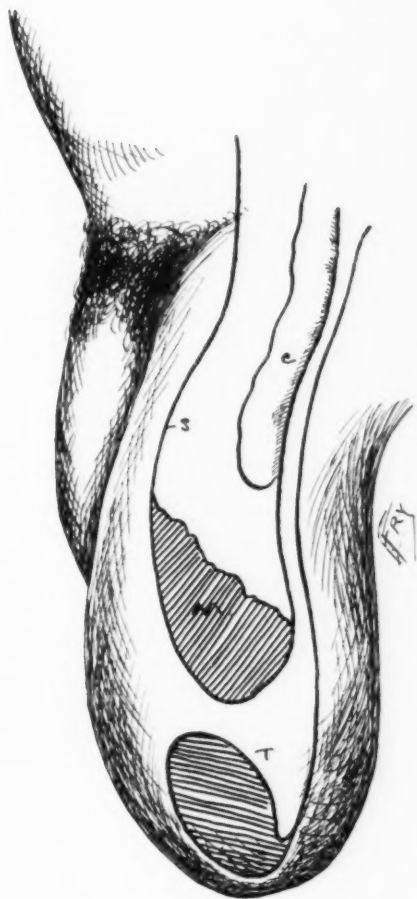


FIG. 6.—Sliding hernia of caecum. *t*, Testis; *c*, caecum; *s*, sac (acquired); *m*, hard, tuberculous looking mass at lower end of sac.

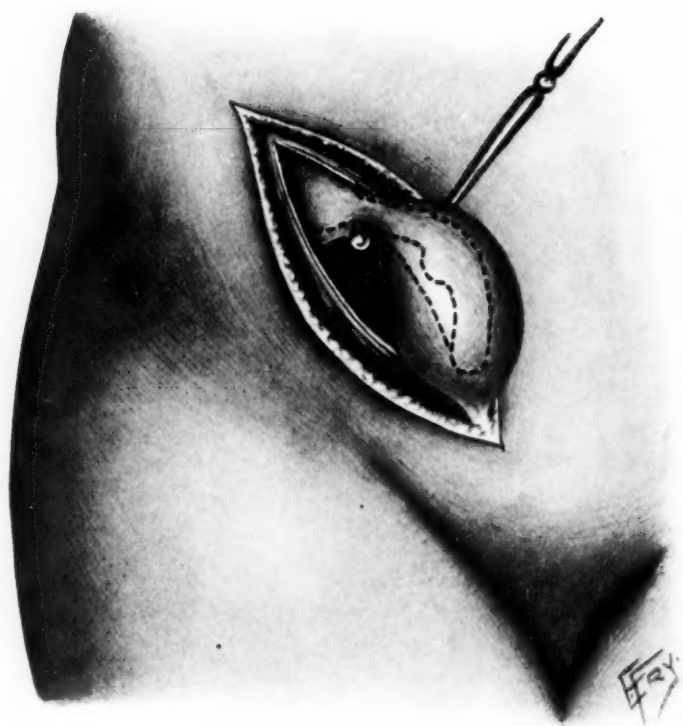


FIG. 7.—Incarcerated hernia of the appendix, with sac distended with bloody fluid.

cæcum, or "Hernie par Glissement," as described by the French writers. Of these eight cases the cæcum alone was present in six cases and the cæcum with the appendix in two cases. The following cuts (Figs. 6 and 7) will show the condition present in this form of hernia.

Cæcal and sigmoidal hernia are the most difficult of all varieties to deal with, either with mechanical or operative treatment, especially when of the sliding variety. It is often impossible to do a typical Bassini operation in these cases, and I have usually been content with closing the canal as carefully as possible without transplanting the cord.

Hernia of the Bladder.—I have personally operated upon one case of hernia of the bladder. The patient was a man forty-seven years of age. The hernia had existed for several years, and was hard to reduce and very painful when down. He had observed frequent micturition when the hernia was down. Operation was performed May 7, 1902. The bladder was not opened at operation, but was recognized in time. The patient was well January 8, 1903.

I have had two other cases of bladder hernia on my service at the General Memorial Hospital, but in both cases the operation was performed by my associate, Dr. William A. Downes.

Tubercular Hernia.—I have operated upon three cases of tuberculosis of the hernial sac, two children and one adult. In two cases the diagnosis was confirmed by the microscope, and in the other the clinical appearance was characteristic. In one case, a boy aged six years, an operation had been performed for a large left inguinal hernia with reducible hydrocele in September, 1900. Nothing unusual was noted in the appearance of the sac. A few months later he developed a hernia with fluid in the sac on the opposite side, and operation was performed on March 19, 1901. The sac was found studded with miliary tuberculosis, and examination by Dr. Jeffries, pathologist to the Hospital for Ruptured and Crippled, confirmed the diagnosis. The patient was well when last observed, eight months later. There were no signs of tuberculosis elsewhere.

A second case occurred in a femoral hernia in a young woman aged twenty-three years. In this case there were signs of tuberculous disease in the lungs.

Strangulated Hernia.—I have operated upon seventeen cases of strangulated inguinal and femoral hernia with two deaths, one death occurred in a case of femoral hernia strangulated for three days, and in which I was obliged to resect seven inches of intestine. The other was in an infant six weeks old with a strangulated cæcum and appendicular hernia of three days' duration. The child was nearly moribund at the time of operation. In the remaining fifteen cases a radical operation (mostly by Bassini's method) was performed, and there has not been a single relapse. Primary wound healing occurred in every case. In nine cases the patient was under the age of two years and in eight under one year, the youngest being an infant aged thirteen days with a hernia strangulated fourteen hours. The patient left the hospital at the end of three days, and the hernia remains well more than a year after operation. It is important to note that in every case the strangulation was not caused by the neck of the sac, as is stated by most writers, but by the tense external abdominal ring.

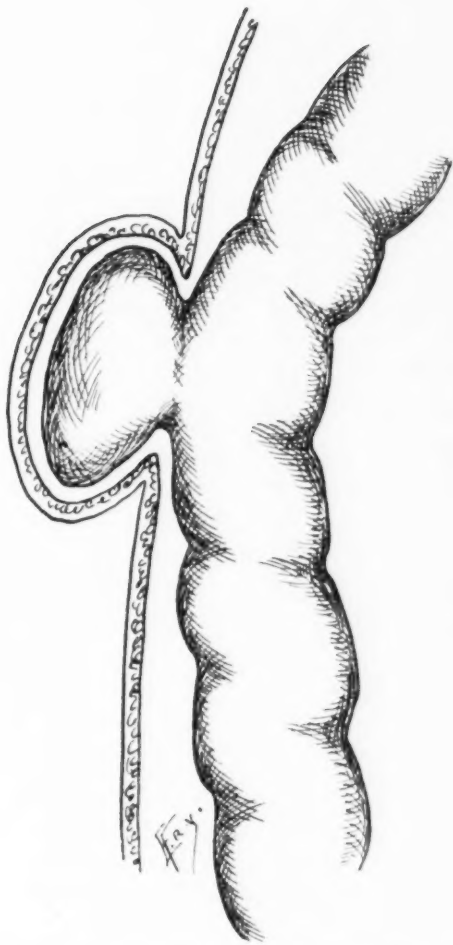
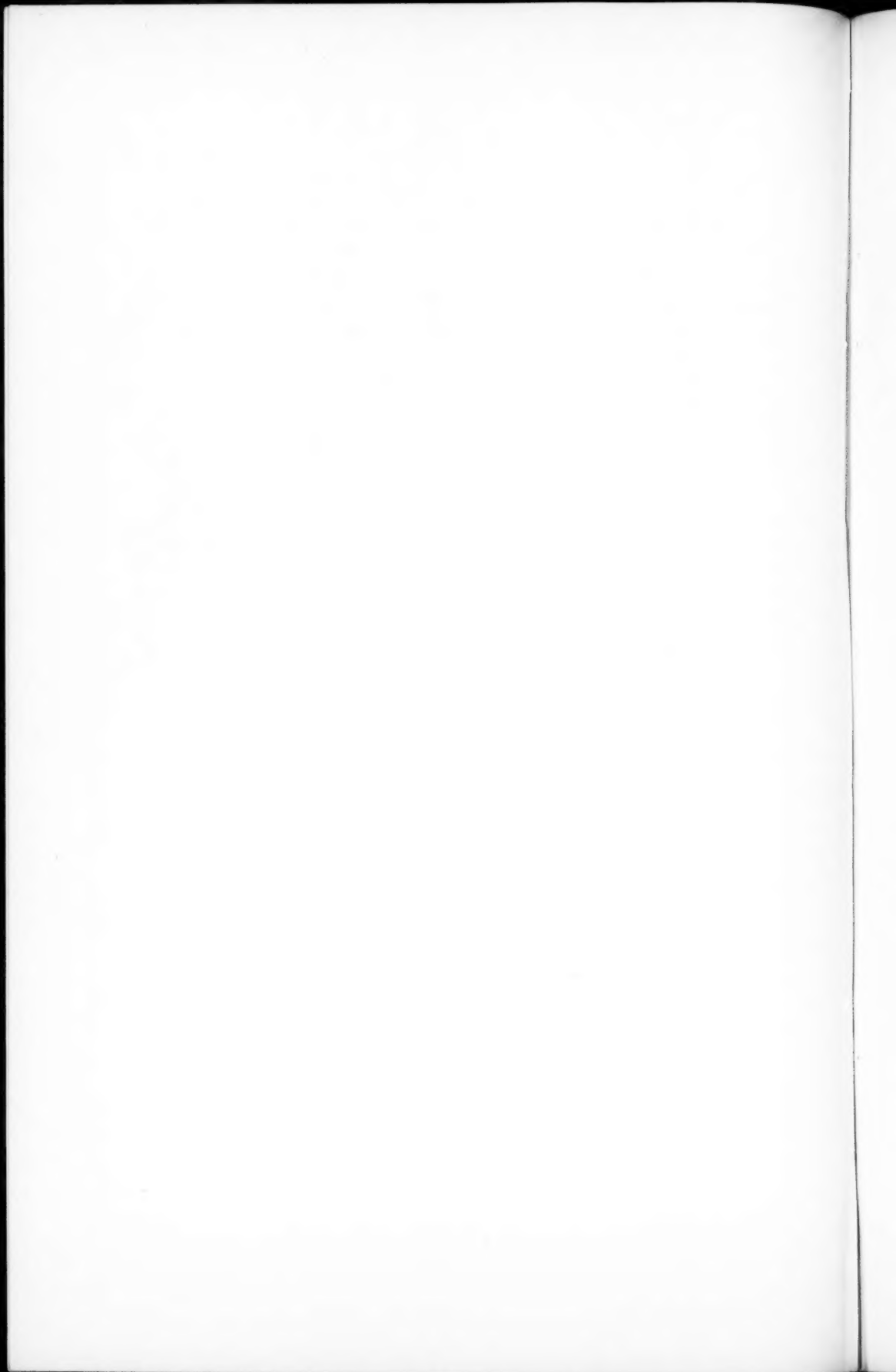


FIG. 8.—Strangulated properitoneal Richter's hernia. (Partial enterocele.)



MYOSITIS OSSIFICANS.¹

WITH A REPORT OF TWO CASES,—ONE TRAUMATIC, THE OTHER NON-TRAUMATIC.

BY WILLIAM J. TAYLOR, M.D.,
OF PHILADELPHIA.

ALTHOUGH knowledge concerning the etiology of "myositis ossificans" is obscure, there have been enough cases recorded to establish it as a definite condition; but we are still very uncertain as to its cause. There are two great classes. The first those where bone has formed in the softer tissues, with or without history of injury, and in which no connection can be found apparently with the bones of the skeleton or their periosteum; and again, in others there may be osteophytes to which muscle tissue is attached and which has undergone osseous change.

The second is where there is a formation of new bone resulting directly from an accident to bone or its periosteum and involving the muscles and fibrous structures. All these conditions are found in youth. Those of the first class are characterized by local swelling, and, later, loss of function, with gradual ossification of the muscle. This is the most common. A number of cases have been reported under the second heading, in which the muscles become ossified quickly after a single injury, generally, as in my own case, following the kick of a horse, and, as in F. Munro's case, from an injury to the thigh received in a foot-ball game. (F. Munro, *Lancet*, February 21, 1891, p. 427.)

In Munro's case, a young man of twenty-four received a blow on the right thigh while playing foot-ball. He was incapacitated from work for three days. A week after the accident he noticed a hard swelling an inch and a half above the outer side of

¹ Read before the Philadelphia Academy of Surgery, March 2, 1903.

the knee-joint. This got larger, and five weeks after the accident he sought medical advice. On examination, there was found what seemed to be a lump of bone lying loose in the muscle of the outer side of the thigh. It was about eight inches long, narrow, and projecting at its lower end and approaching the surface, but broadening out as it passed up the thigh and lying more in the muscles. It was slightly movable except at its upper end. The patient could walk about fairly well with the assistance of a stick, but was able to flex his thigh only very slightly. After about two weeks an incision three inches long was made over the projecting portion, and in the substance of the vastus externus was a mass which had to be removed with bone forceps. There were no complications, and the patient left the hospital well in the course of a few weeks.

Mr. Bilton Pollard (*Lancet*, December 31, 1892, p. 1491) reports a case of "myositis ossificans" in a boy of nine, where a large number of the muscles became ossified without there being any particular injury to account for it. An operation was performed and the teres major muscle was exposed. The bone was found to occupy the substance of the muscle in nearly its whole extent.

Dr. F. W. Burton-Fanning (*Lancet*, September 28, 1901, p. 849) reports a case of a man aged thirty-three, who at the age of eight years had gradual stiffening of the left shoulder without previous injury or pain. At the age of twelve the right knee became impaired until all power of motion had gone. Following this in order came stiffness of the left hip, sides of chest, and lower part of back. At the age of twenty-eight the right arm from the shoulders downward was much swollen, the skin being red and tender. The inflammation was so acute that the arm was thought to be poisoned, but the swelling gradually passed off, and the arm was found to be flexed in the extended position, while the movements of the shoulder previously impaired were diminished. Flexion and extension remained at the wrist, but the forearm could only be supinated through half the natural extent. Two years later stiffness of the right hip was noticed, and this gradually extended until the legs became affected and the patient had numerous falls, but he had never seriously hurt himself, and could not attribute an increase of his malady directly to any injury. He was remarkably free from any other disease.

There was a family history of his father having had "myositis ossificans," and dying at the age of thirty-three from an accident.

Mr. Charles Stonham (*Lancet*, December 31, 1892, p. 1485) speaks of the causation of the disease as being shrouded in obscurity, but that it is essentially one of early life. While heredity is supposed to be a large factor, there are comparatively few in which this can be traced. Most of the cases of "myositis ossificans" cannot be directly traced to any trauma, and there is a history resembling in large part muscular rheumatism; in the cases which he reports and the illustrations which he gives, there seems to be an overgrowth of the bony tissues and the formation of osteomata and osteophytes, as well as ossification of certain of the muscles.

In the illustrations which he gives, the osseous formations are many of them independent of the skeleton, but in some parts they are attached to it, spreading into the muscular insertions as pointed, stalactite-like masses. True spongy exostoses may also be met with. Usually in the form of flattened, perforated plates, the bony tissue may be in nodular masses or sharp and pointed.

He appends a large number of references to cases in English, American, and Continental journals.

Dr. Lydia M. Dewitt (in *The American Journal of Medical Sciences*, September, 1900, p. 295) published a very elaborate pathological report from two cases of "myositis ossificans."

The first case resulted from chronic inflammation (possibly tuberculous), in which ossified masses were found immediately surrounding the femoral vessels, and extending in all directions between the degenerating and regenerating muscle-fibres.

The second case resulted from an injury to bone,—a fracture of the thigh,—which may have injured also the muscles and other soft parts.

Munro (*Lancet*, February 21, 1891, p. 427) speaks of

"myositis ossificans" as a result of chronic inflammation either localized or general. In the localized variety the inflammation of the connective tissue is usually the result of repeated slight injuries, the bony tumor in one case appearing five weeks after the injury.

Heredity, although claimed by many writers to be a factor in the causation of the disease, does not seem to play any large rôle in its production, although there are a few cases where it would seem to be operative.

Treatment in the non-traumatic variety has been of little avail in the majority of cases; excision of the muscles doing little or no good, as the ossification of some of the degenerated muscles has very soon taken place.

In Dr. Keen's case, reported in the present communication, excision of the ossified muscle has, however, been of distinct advantage, as in nearly two years there has been no recurrence nor apparently any disability resulting.

In the traumatic variety, or if we might use such a term as acute traumatic, where the condition has followed the receipt of one severe injury, operation and the complete excision of the degenerated muscle and fibrous tissues have resulted in complete relief.

Through the kindness of Dr. Keen, I am able to report his case, and thus give an illustration of the two great varieties of this very peculiar affection. It was my privilege also to assist him in the operation performed upon his patient, and to see her constantly during her convalescence.

These are the only cases I have ever been fortunate enough to see, and in my own case I was at a loss at first to account for the condition which I found at operation; indeed, for a time, and until I received the report of the pathological findings, I feared that it might be sarcoma. The complete freedom from pain made me feel somewhat reassured.

CASE I. *Myositis Ossificans Traumatica*.—A young man, twenty-six years of age, of robust health and fine general physique, whose occupation was that of schooling young hunters, was

kicked by a horse, December 15, 1900. He had never had rheumatism, but had a slight mitral murmur. The hoof struck him in the middle of the thigh on the anterior surface. The blow was so severe that he was knocked down, and he thought the thigh broken, but in a short while he was able to get up and walk, walked his horse for some distance, and then with the assistance of some farmers was lifted into the saddle and rode home. The pain was intense, but not completely disabling. A remarkable thing about his injury was that the horse kicked him on Saturday with such force that he thought the thigh was broken, but he was able to walk; and the next day, being Sunday, he did not ride, for this is their custom at his stock farm; but on Monday he got on a horse and had ridden every day until I saw him. He had comparatively little pain except upon extending the thigh and flexing the leg upon the thigh; and he found of late that he did not feel secure in his seat when riding a restless horse, and that his efforts to clutch with his knees gave him pain. He had none of the dull aching or throbbing pain of a sarcoma.

When first seen by me on January 5, 1901, just three weeks after the receipt of the injury, there was a marked swelling on the anterior surface of the left thigh about its middle, and over which the muscles readily rolled. The swelling was hard, but did not feel bony; it gave rather the sense of an organized hæmatoma beneath the periosteum. With the limb at rest there was no pain whatever, but on certain movements of the limb there was pain; this was most marked upon flexing the leg upon the thigh.

On January 8 I made an incision through the rectus muscle down to the periosteum. I found the whole area of the bone—especially of the anterior surface—enlarged and the periosteum thickened, and the muscles—particularly the deeper fibres—containing small bony particles. The pieces of bone and muscular tissue that I removed were directly in contact with the periosteum, which was elevated and the bone beneath found roughened. At one place I removed a small spicule of loose bone. I curetted the bone, removed all the thickened portion of the muscles that I could, and closed the wound with an iodoform gauze wick for drainage. He made an absolutely uneventful recovery, and he had no pain or discomfort.

The muscles and fibrous tissue removed were sent to Dr. W. M. L. Coplin, who sent me the following report:

After a very detailed and minute description of the methods employed in making the examination and of the microscopic appearances of the specimen, he states:

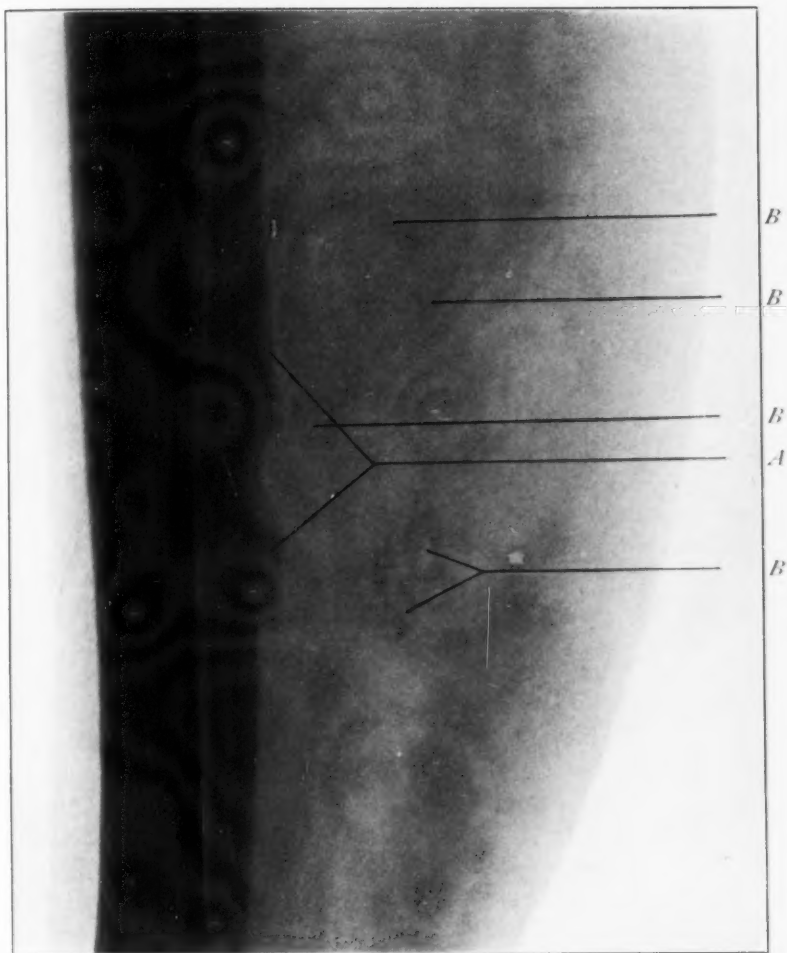
"A definite diagnosis from the examination of disconnected fragments of tissue, such as those submitted in this case, may seem hazardous, but the findings recorded above strongly suggest the diagnosis of ossifying myositis."

CASE II. *Myositis Ossificans*.—Miss A., aged forty years, first consulted Dr. W. W. Keen on April 22, 1901. At nine years of age her mother discovered a slightly tender lump over the left fibula near the junction of the middle and lower thirds of the leg. She had some pain in the leg, which was thought to be rheumatism. At fourteen, walking became distinctly painful, and the muscles gradually contracted until her foot was in marked extension, *i.e.*, an acquired equinus. At sixteen, tenotomy was done, the deformity, however, returning immediately. Some X-ray pictures which she had had taken in Washington showed that there was apparently an irregular, sharp osteophyte growing from the fibula at the point indicated (Fig., A), and that the bone was thickened for some distance above and below this point. There were some other spots in the picture which made me suspect myositis ossificans, though I was doubtful whether they might not be defects in the photographic plate.

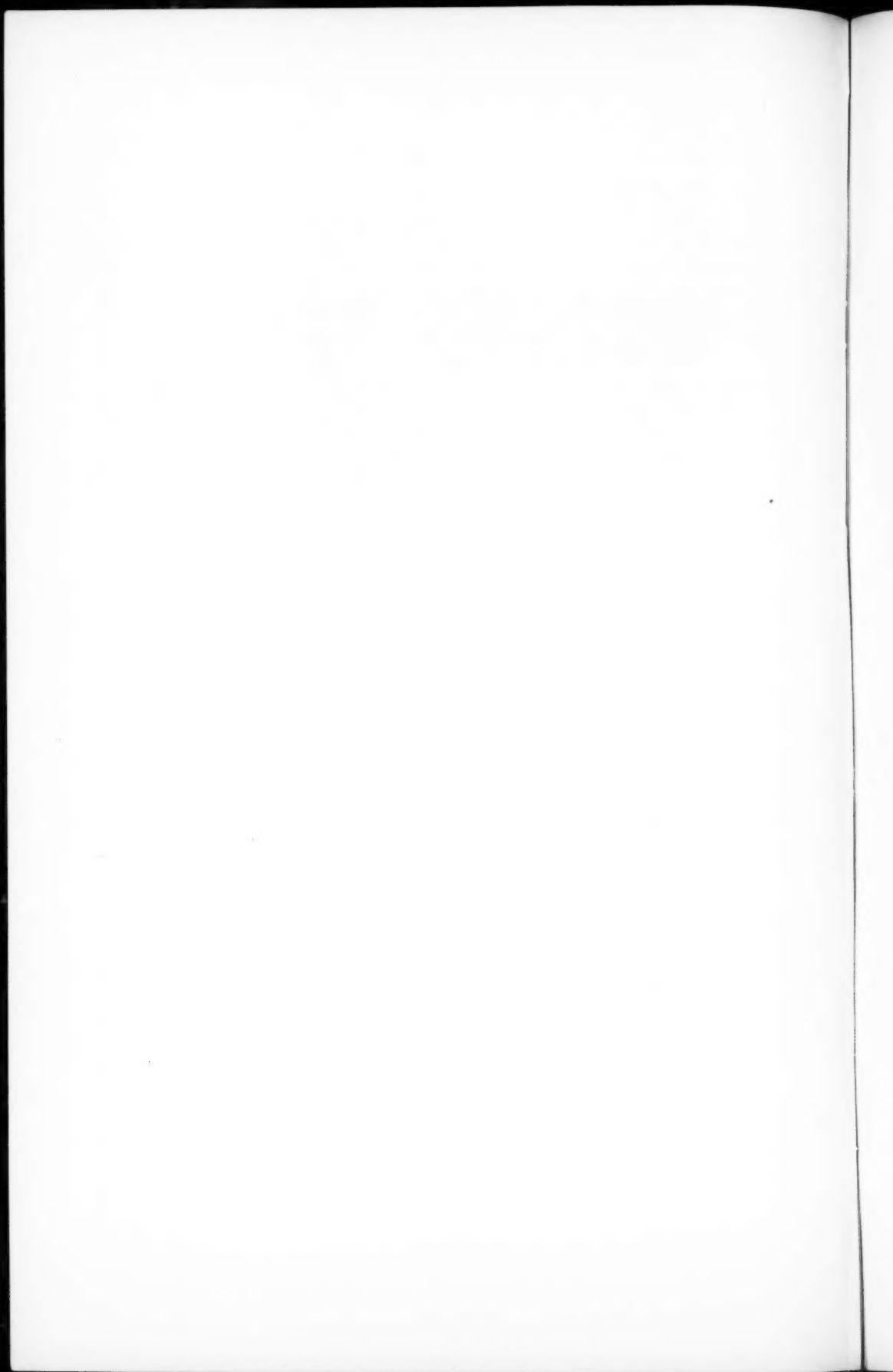
The muscles of the right calf were distinctly harder than those of the left calf. I advised operation, which was accepted at once.

Operation by Dr. Keen, May 3, 1901.—I had three objects in view: first, to chisel away the supposed osteophyte, which was still quite painful; second, to lengthen the tendo Achillis, and, third, to remove all of the supposed ossified plates if I could do so.

I made an incision somewhat posterior to the fibula. This passed through quite a thick layer of fat. The deep fascia I found to be irregularly thickened with plates of what I judged to be bone at various places. These multiple bone plates extended well back to the middle of the calf, but, apparently, not to the inner side of the leg. There were also a considerable number of them in the muscular tissue. There was no osteophyte growing from the fibula, but the irregular plates of bone were in contact with the fibula. In order to remove the whole of these bone plates, I was obliged to prolong my incision, so that it finally



Skiagraph of the bony plates in Dr. Keen's case of myositis ossificans. *A*, the apparent exostosis from the fibula; *B*, the other osseous plates in the muscle.



reached from the upper end of the calf nearly to the heel. At one place there was very annoying though not serious bleeding, which I could not control by repeated ligature and suture-ligature. What I thought to be a large vein ran along with the bleeding artery. Finally, in order to control the bleeding, I cut across both artery and vein, and to my surprise found that the supposed vein was a large nerve. It was very much enlarged, was beaded, and so intimately involved in one of the plates of bone and fibrous tissue constituting the disease that it could not be dissected out, and would have had to be sacrificed in any case. I stretched the two ends of the nerve (for they were separated 2.5 centimetres when the foot was flexed to a right angle), when I discovered what it was, and united them with two silk ligatures. The tendo Achillis was divided after Mr. Anderson's and my own method and lengthened by four centimetres, which allowed the foot to be placed at a right angle with the leg.

On May 12 I removed two small tumors, one from the right and one from the left breast under cocaine anæsthesia. Professor Coplin reported them to be "peri- and intercanalicular fibromata of the breast."

Recovery from all three operations was *per primam*, and she left the hospital on May 18. She was then able to move the foot quite freely both in flexion and extension.

I was extremely doubtful at the time, and still am, as to what nerve was divided. The day that she left the hospital, a hair lightly drawn across the foot was felt distinctly at every point, with the exception of the sole (due probably to the thickness of the epidermis), and at a small area above the heel, where sensation was quite imperfect. On the sole of the foot, however, a touch of a pencil was readily perceived. The nerve divided lay almost in the middle line of the leg between the calf muscles and the skin. This would exclude, of course, the posterior tibial; yet it was so large,—its size being about that of the normal posterior tibial,—that it did not correspond with any ordinary cutaneous nerve. Sensation, moreover, was but slightly affected by its division, as I have indicated. Unfortunately, I was not able to make more accurate and frequent examinations on account of absence from the city.

Miss A. writes me under date of December 17, 1902, nearly twenty months after operation, that she has suffered no pain in the

muscles since leaving the hospital, that the foot can be flexed to a right angle, and that she can bear her weight on her toes. Non-recurrence of the disease, especially in view of the evidently diseased condition at the margin of the portions of tissue removed, as shown by Dr. W. G. Spiller's report, is especially noteworthy.

Dr. Spiller's report on the nerve and muscle is as follows:

"The tissue removed at operation and sent to me by Dr. Keen is exceedingly dense, much denser than any normal muscle, and in some places has a gritty feel. It can, however, be easily cut with a knife, and when embedded does not turn the edge of a microtome knife. It is not necessary to employ decalcification. To the naked eye the tissue has little or no resemblance to muscle, but appears like dense, fibrous material. In microscopical sections where the alteration is greatest the tissue resembles tendon, and has a glassy appearance when stained with eosine. Numerous masses of closely packed round cells are found throughout the sections, and much recent infiltration of red blood-corpuscles, the result of the operation, is found. The walls of the blood-vessels in the dense fibrous tissue are much thickened, and are infiltrated with round cells, and the lumen in some is very small. Where the tissue is most altered, the muscle-fibres are extremely atrophied, and in a large portion of the tissue have entirely disappeared. The sections in some parts consist almost entirely of fibrous and fatty connective tissue, and here the muscle-fibres are widely separated from one another by this fibrous tissue. In these places the muscle-fibres appear as long slender bundles in longitudinal section, and are many times smaller than normal muscle-fibres, and are without any striation, either transverse or longitudinal. The tendon-like appearance of certain parts of the sections is due to the fibrous proliferation which has caused more and more pressure upon these atrophying muscle-fibres until they have entirely disappeared. Here and there in these tendon-like masses a few scattered muscle-fibres may be seen. The Weigert hæmatoxylin stain shows their presence very beautifully. Where the muscle-fibres are very much atrophied, the sarcolemma nuclei appear unusually numerous; but this is chiefly because the atrophied fibres occupy less space, and the sarcolemma nuclei are, therefore, brought closer together. There is, however, some increase in the number of the sarcolemma nuclei. Only in tissue taken from the edges of the mass removed at operation have I

been able to find muscle-fibres of anywhere near normal size; and here they are irregular in outline, are cleft transversely in longitudinal section, and have lost the transverse and longitudinal striations. The sarcolemma nuclei in these muscle-fibres are proliferated, and in places form chains of nuclei within a muscle-fibre.

"Osseoid plates are not very numerous, but are found in some sections. They are irregular in shape, and stain a deeper purple at the edges with hemalum and faintly in the interior. They contain concentric lines and numerous irregular starlike bone cells. The formation of the latter has not been of very long duration, as in old bone the cells do not possess these numerous proliferations. Although the tissue feels gritty before it is embedded, the sections under the microscope do not contain a large amount of osseoid tissue. I have found a mass in one of the sections that appears more like cartilage than bone. In this the nuclei are small and round and the cells resemble cartilage cells. The ground substance is pale yellow, and does not show the concentric markings seen in the distinctly osseoid tissue.

"The condition is one of myositis fibrosa passing into myositis ossificans.

"The nerve that was cut during the operation is much degenerated, and is embedded in the proliferated fibrous tissue, so that even under the microscope it forms an intimate part of this tissue. The connective tissue between the individual nerve-fibres is greatly increased in amount, and for this reason the nerve appears abnormally large.

"In regard to the recent literature on myositis ossificans, I may refer to the valuable paper by Lydia M. Dewitt (*The American Journal of the Medical Sciences*, September, 1900, page 295), and to the monograph on diseases of the muscles by H. Lorenz (Nothnagel's 'Specielle Pathologie und Therapie,' Band xi; 3. Theil; 1. Abtheilung). In these two publications most of what is known of myositis ossificans may be found."

ON THE PATHOLOGY OF SO-CALLED BONE ANEURISMS.

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THE term "bone aneurism" has been applied to certain obscure, pulsating, markedly hæmorrhagic tumors of bone. These tumors have not received as much consideration in the more recent literature as in the days of Dupuytren, Velpeau, Nélaton, Jr., and Gentilhomme, when they were the subject of a spirited controversy which was terminated by the thesis of Gentilhomme in 1863, which concluded, "que les aneurysmes des os n'existent pas." The entire subject might well have passed into obscurity, had it not been revived by an article by Oehler in the *Deutsche Zeitschrift für Chirurgie*, 1893, who concluded that bone aneurism was a specific affection and worthy of separate consideration.

The first reference to the affection was made by Percival Pott, but a satisfactory description was first given by Else in 1769. Turning to the work of Richet and Volkmann, we find that these authors accept five cases which have come down through the literature as examples of bone aneurism.

The first case, that of Pearson, occurred in a laborer sixty-three years of age, otherwise in good health. The tumor made its appearance below and on one side of the patella. There was no evident pulsation at this time. Four months later the tumor had increased in size, protruded on both sides of the patella, and pulsated sufficiently to be visible to the naked eye. Amputation

¹ The material for this article was obtained while the writer was an assistant to Professor Orth in the University of Göttingen in 1897. The publication of the article has been unavoidably delayed until the present time.

was decided upon and was made above the knee. So soon as the large vessels were divided, a considerable amount of blood flowed from the crural artery, and the sac immediately became flaccid. Following the operation, the stump became infected, and the patient died of pyæmia five weeks later. On dissecting the limb, the vessels of which had been injected, nothing abnormal was found until the sac was opened on its anterior aspect, when it was found to contain red injecting material and coagulated blood as well as some material of offensive odor. On clearing out the sac this was found to occupy a cavity in the head of the tibia sufficiently large to contain half a pint of fluid. The anterior and posterior portions of the tibia were completely destroyed. The wall of the sac resembled thickened periosteum, and was lined with a substance similar to that found in aneurismal tumors. The two lateral portions of the tibia were so thin as to be transparent. The joint was not involved. Pulsation was attributed to the intimate communication of the sac with the vessels in the ham, but the presence of the red injecting material distinctly indicates that the tumor communicated with some branches probably of the popliteal.

In Case 2, that of Scarpa, the tumor was likewise located in the upper end of the tibia, and in many respects closely resembles that of Pearson, with the exception that seven years after the removal of the sac a second tumor extending to the thigh developed, from which the patient died. In this, as in the case of Pearson, the tumor appeared to communicate with branches of neighboring vessels. The recurrence of the tumor speaks for the malignant nature of the growth; although Scarpa considered the aneurism to be the result of rupture of blood-vessels leading to the destruction of the bone and the formation of a cavity therein.

Case 3, Carnochan, was a cyst located in the lower end of the femur, which formed eight months after contusion at this point. In this case pulsation and a distinct bruit were observed. Ligation of the femorals was followed by cessation of pulsation and a decrease in size of the tumor. The wall of the cyst contained a structure of bone and did not collapse. In the course of five or six weeks the cyst was again distended and amputation of the femur was performed. The cyst proved to be of large size and was filled with blood, and communicated with several vessels. Examination was made for *sarcoma* and *carcinoma*, but neither was detected.

Case 4 was a large tumor in the neighborhood of the tuberosity of the tibia. Fluctuation could be elicited and slight pulsation was present; no bruit. Amputation of the femur was performed, followed by healing, with no return of the tumor after two and a half years. Dissection of the tumor showed that the head of the tibia was transformed into a large cyst cavity, the wall of which was very thin and extremely elastic. It was filled with fresh blood and clots. A microscopic examination was made and *no tumor elements were detected*. Injections of water through the popliteal vessel revealed numerous communications with the tumor through minute openings on the inner surface of the cyst wall.

Case 5, Richet, developed in the neighborhood of the shoulder and extended from the insertion of the deltoid to the acromion process, with involvement of the entire circumference of the humerus. The tumor was soft, fluctuating, and in many spots crepitation could be elicited. There was a distinct bruit but no pulsation. Amputation at the shoulder was made, followed, after four weeks, by death. At the autopsy no metastases were detected. The tumor consisted of a large sac filled with brown fluid and coagula. The wall of the sac was composed of a dense, fibrous structure, which, below, was apparently continuous with the periosteum and extended upward to the articular cartilage of the head of the humerus. The wall of this sac contained irregular plates of bone. Attempts to inject the sac from the larger vessels were not successful, but many small arteries could be seen penetrating the cyst wall. *A microscopic examination was made of the cyst wall, but no tumor elements were found.*

Besides the five classical cases here referred to, three articles have appeared in the recent literature containing the reports of cases of a similar nature in which microscopic examination failed to show the presence of sarcoma or carcinoma. They were likewise considered as cases of bone aneurism by the respective writers.

The first is that of Pillot and Anger, in which the tumor developed in a man of twenty-six years posteriorly on the inner side of the lower end of the femur. On admission to the clinic, the tumor was distinctly palpable, elastic, and tense, but did not

pulsate, and there was no bruit. The tumor was supposed to be due to a collection of pus beneath the periosteum. On cutting into the tumor, a large amount of dark-colored blood flowed from the cavity. The hæmorrhage which followed was controlled with great difficulty. The patient had chills, elevation of temperature, and four weeks after the incision the leg was amputated at the thigh. A large thrombus was found in the femoral vein, and the patient died the next day of pulmonary emboli. On dissecting the amputated leg, the tumor occupied a position beginning four centimetres above the condyles of the femur on the posterior aspect and extending upward seven centimetres. Beneath the periosteum were found three connecting cavities filled with blood. The first was beneath the periosteum, and had been incised at the first operation; the second, within the cavity of the bone, and the third, beneath the periosteum on the anterior surface. All three were in communication with larger and smaller vessels. The periosteum at the posterior margin contained numerous deposits of bone and osteophytes. The cavities of the tumor were lined with stratified layers of fibrin. The microscopic examination was made in the laboratory of Professor Robin and reported upon by M. Gaucher. The exact wording of his statement is as follows: "On microscopic examination, one could hesitate between aneurism of the bone or myeloid sarcoma. My microscopic examination of the clots, of the bone, of the bone marrow, and of the osteophytes formed in the periosteum, has failed to disclose the presence of an increased number of giant cells. I therefore consider that the femur is the site of a true aneurism of bone."

A further case is that of Wythe. The tumor occurred in a young woman, twenty-two years of age, and appeared in the form of a small swelling about the size of a walnut on the upper third of the left femur. After about eight months' duration it began to enlarge rapidly. It occupied the front and inner side of the upper third of the thigh, and on touch gave the sensation of a cartilaginous mass springing from the bone. The femoral artery lay across the side of the tumor and pulsated vigorously. The case was seen by Wythe, who operated. Cutting down upon the tumor, it was found to consist of a lobulated mass three by four inches, arising from the upper part of the femur. The surface of the tumor was of a mottled red and bluish color, crackled on pressure, and appeared to cover a thin layer of bone like an egg-

shell. On cutting into the tumor the blood spurted out for a distance of eight feet. This was of dark venous hue and was controlled by pressure with a sponge. On enucleation the tumor was found to contain many cancellous spicules of bone, which had to be removed in fragments. The cavity was packed with a sponge wrung out in hot water and hæmorrhage was thus controlled. Patient made a rapid recovery. The microscopic examination is quoted literally:

"A careful microscopic examination of the tumor exhibits only bony tissue, softened and expanded, and the débris of blood-cells. There is no appearance of cartilaginous, sarcomatous, malignant, or embryonic elements of any kind, although specimens were selected from various parts of the mass, some examined without special preparation, and others after staining with picrocarmine. It is evidently a case of bony aneurism, not from enlargement of an artery, but an aneurism by anastomosis. The microscopic evidence shows the edges of the osseous trabeculae, which bound the natural cavities or cancelli of the bone, to be decalcified and softened.

"The general appearance of the morbid tissue resembled spina ventosa, but the enlargement was due to simple dilatation of the bone itself. In the few cases of the kind which I find on record, most are associated with encephaloid cancer, but no indication of this was furnished by the dissection or by the microscope in this instance."

A third case, that of Oehler, occurred in a sixteen-year-old boy. There developed after slight trauma a tender swelling on the lower end of the femur. This protruded most prominently above the outer condyle. The consistence of the tumor was elastic, and the margins appeared to gradually merge into the shaft of the femur. There was no pulsation. The tumor was held to be sarcoma of the bone, and exploratory incision was made to confirm the diagnosis. The tumor was incised at the point of greatest prominence above the external condyle, and a gush of blood followed the incision. The finger was inserted and entered a cavity in the bone. This was packed, but the packing failed to control the hæmorrhage. After a few hours, the bleeding was so severe that the patient was again anæsthetized and the exploratory incision widened. The cavity appeared to be sufficiently large to contain 300 cubic centimetres of blood. It extended three-quarters

of the way around the femur and penetrated deeply into the bone, so that not more than a half or a third of the normal thickness of the shaft of the femur remained. The inner aspect of the cavity was lined with rough fragments of bone, and the outer wall of the cyst was composed of dense fibrous tissue in which plates and deposits of bone could be detected. There were apparently no communicating vessels. As a result of this inspection, amputation of the leg was decided upon, from which the patient made a rapid recovery, and has since remained permanently cured. The examination of the amputated limb confirmed the macroscopic description already given. No communicating vessels could be detected, and there was no macroscopic evidence of sarcomatous tissue. Blocks of tissue were removed from various portions and prepared for microscopic examination. These, under the microscope, proved to consist of bony structure without lamellar arrangement, and closely resembled in appearance newly formed callus. The spaces between the trabeculae were filled with a tissue rich in cells. The bone corpuscles appeared in the form of large granulated cells lying in encapsulated spaces. The usual prolongations of these cells could not be detected. Scattered between the trabeculae were areas of cartilaginous tissue. The medullary spaces were traversed by large vessels surrounded by round cells. From the periphery towards the cavity the osteoblasts gradually increased in size, the round cells were more densely packed, and a few giant cells made their appearance, until at the margin of the blood-filled cavity these elements formed a narrow margin of tissue free from bone trabeculae. There was no evidence of a capsule or organized layer of connective tissue separating the cavity from the bony structure. This condition of affairs existed over the entire surface of the cavity, including the portion where it penetrated into the shaft of the femur. In the wall of the cavity in many places were found groups of cells embedded in coagula. These, as well as the narrow layer of tissue lining the cavity, especially where the cells were cut obliquely, closely resembled round and giant-cell sarcoma, but in the opinion of Oehler did not constitute a distinct *sarcomatous tissue*, for the reason that *there was no well-defined boundary between it and the tissue of the medullary spaces.*

From a consideration of the three cases of Anger, Wythe, and Oehler, it will be noted that in the first two the statement

is made that sarcomatous tissue was not present. The description of the microscopic examination in the case of Wythe is far from satisfactory, and the grounds on which Gaucher concludes that the case of Pillot and Anger was not of sarcomatous nature would seem open to question. His conclusion, that because the giant cells were not increased in number, and therefore the case was not one of sarcoma, is not in accord with our present knowledge of these neoplasms. The statement of Wythe regarding his case leaves some doubt as to the basis on which he concluded that sarcomatous tissue was not present; and the many cases of well-defined sarcoma recently published, especially those of Weil and Oberst, of sarcomas of bone in which large cavities containing blood were formed, the cavity being lined with sarcomatous tissue, so strongly suggests the structures described by Oehler, that it is difficult to say how that author arrives at the conclusion that his case, and probably the five quoted by Richet and Volkmann, represent a separate, obscure affection of the bone. Oehler calls attention to the fact that these tumors seldom produce metastases, that recurrence after operation is rare. The case of Scarpa is, however, an exception to even this last statement, recurrence after seven years in this case strongly indicating the malignant nature of the process.

That these cases are not as malignant as many forms of sarcoma is well known. A number of clinical observations have been reported, in which fluctuating, hæmorrhagic tumors of bone, or bone aneurisms, have been observed to disappear after a period of time. One of these, reported by Roughton, was subjected to microscopic examination and found to be a sarcoma. The tumor developed below the knee; it was elastic on palpation, and the wall of the cyst appeared to contain thin plates of bone; there was no pulsation, no bruit. The tumor was incised, and a cavity containing approximately sixty cubic centimetres of blood was opened. There was no evidence of communication of this cavity with larger vessels. A portion of the wall of the tumor was removed for examination, which showed the presence of sarcomatous tissue. In the course of

ten months the tumor entirely disappeared, and the function of the parts was completely restored.

Realizing the nature of the claim which the so-called "bone aneurisms" have to classification as separate affections of the bone, rather than malignant tumors with unusual characteristics, the following case may not be uninteresting.

Description of writer's case. The specimen in question was sent to the Pathological Institute in Göttingen, April 3, 1897, from the Peter Friedrich Ludwig Hospital, Oldenburg. The following short history accompanied the preparation, and attempts to obtain a further history one year later were not successful. The patient had suffered three years before from a fracture of the lower end of the right femur produced by direct force, which had healed satisfactorily. One year later the patient slipped while walking across a slippery floor, and in attempting to steady himself stiffened the right leg forcibly, and the femur was again broken at the point of the old fracture. This second fracture was again followed by healing, which was accompanied by excessive callus formation and succeeded by an unusual amount of thickening at the point of fracture. In the course of the second year this thickening increased until the size of the present tumor was reached. At this time the patient came into the Peter Friedrich Ludwig Hospital, Oldenburg, where the diagnosis of sarcoma was made and amputation performed. On cutting into the tumor, a quantity of grayish yellow material flowed from a large cystic cavity and from a smaller, fluid blood. Fluctuation was easily elicited before the operation. It will be noted that there is no reference to pulsation or the presence of a bruit.

Macroscopic description of tumor. The specimen sent to the institute consists of the lower two-thirds of the right femur. This portion of the thigh is markedly distended, and forms, on the anterior surface, a rigid tumor over which the soft parts are tensely stretched. The involvement begins just above the condyles and extends upward to about the middle portion of the femur. On the outer and posterior aspect the wall of the enlarged femur is elastic and can be compressed. The articular surface of the condyles and the sawed end of the femur above present no abnormalities. It is decided to divide the femur in its long axis into anterior and posterior halves. After sawing through

the bone it is found to contain a large cavity, the inner wall of which extends downward to a point just above the internal condyle. This portion of the cyst wall contains extensive deposits of bone and has to be sawed. The condyles below are sawed in the same plane, and the outer aspect of the cyst is readily divided with a knife. On laying open this cavity it is found to possess the following dimensions: The greatest length in the long axis is twenty centimetres; the greatest diameter twelve centimetres. Projecting into the cyst cavity just above the external condyle is a mass of spongy tissue about the size of a large lemon, or more exactly, when measured in the long axis of the cyst, nine centimetres and transversely five and one-half centimetres. The surface of the anterior wall of the cyst is of dark-red color, finely granular to the touch, and in many places covered with a distinct layer of fibrin. This can usually be stripped from the surface with forceps, and then exposes a smooth underlying surface. Extending from below posteriorly, from a point about midway between the condyles at the epiphyseal line upward to a point where it becomes continuous with the outer and posterior aspect of the shaft, is a ridge which divides the anterior wall of the cyst into two portions. This ridge on palpation is hard, and evidently represents a continuation of the shaft of the femur upward through the wall of the cyst. The entire anterior wall of the cyst is found to possess a groundwork of bone from one millimetre in thickness at the thinnest part to thirty millimetres at the prominence of the ridge just mentioned. On inspection of the cut surface of the internal wall of the cyst, it presents a roughened, stratified appearance which, from within outward, consists first of a thin layer of fibrin lining the cyst cavity; beneath this a dark-red zone, then a grayish-white zone, which in certain parts are replaced by distinct deposits of bone, and over this the muscular structure of the thigh. An examination of the shaft of the femur above shows that the medullary cavity of the shaft is separated from the cyst cavity by a layer of hard bone three millimetres in thickness. Upon this is a layer of apparently fibrous tissue with the usual deposit of fibrin upon the surface. The shaft of the femur at the lower portion just above the condyles shows a rough, uneven surface, and at the point where the mass of spongy tissue protrudes into the cyst cavity are numerous cystic excavations in cancellous portion of the bone. The mass of tissue already men-

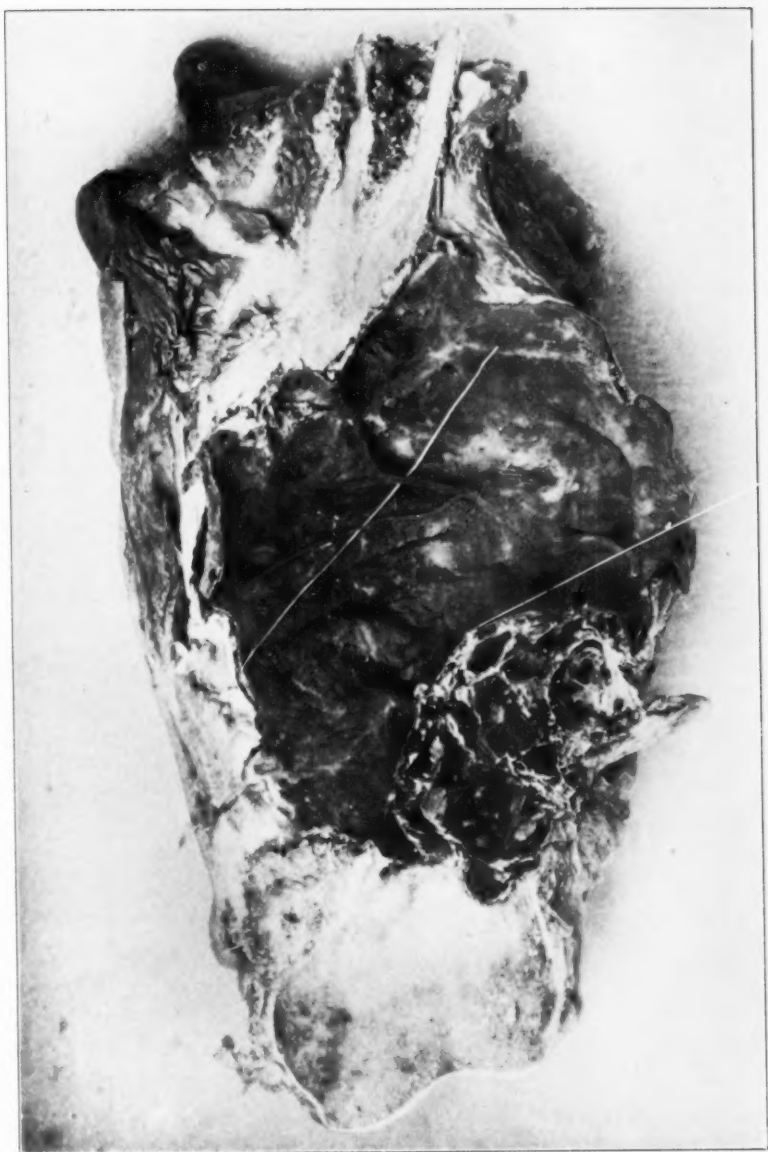


FIG. 1.—Posterior surface of sarcomatous hematoma of lower third of femur. At *a*, a mass of cavernous tissue extending into the cyst cavity. At point *a* characteristic sarcomatous structure was detected. Traversing the wall of the cyst, two well-defined arterial branches supported by a probe.

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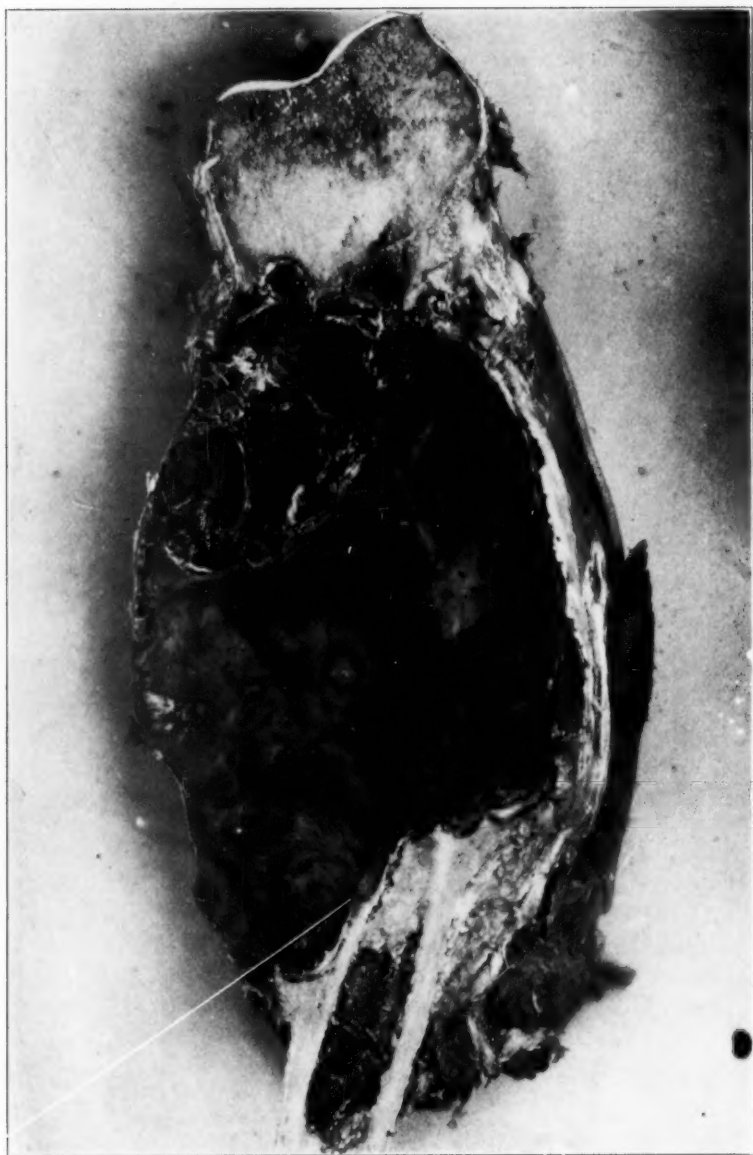


FIG. 2.—Anterior aspect of the same cyst. Continuation of the shaft of the femur is found in a rib passing along the anterior aspect of the cyst cavity. At *a*, point showing repair of the shaft of the femur at its junction with the cyst wall.

tioned possesses a grayish groundwork which separates the small, but numerous, hæmorrhagic cysts. The posterior wall of the cyst is more or less collapsed, the surface being thrown into numerous folds and wrinkles. Palpation discloses but a few thin plates of bone irregularly distributed. Traversing the posterior surface and running free in the cyst cavity for a considerable distance are two blood-vessels. The larger of these has a diameter of three millimetres, the smaller of one and one-half. Although the limb was not dissected to definitely ascertain their origin, they are probably branches of the popliteal. Sections for microscopic examination were taken through the thickness of the internal wall of the cyst, from the upper end of the femur where it terminated in the cyst, from the internal wall, and a large number of pieces were cut from the spongy mass of tissue protruding into the cyst cavity.

The examination of the sections, hardened in formalin, stained with hæmatoxylin eosin taken from the internal portion of the cyst wall, shows that the surface of the structure is composed of young connective tissue, the most superficial layer of which contains numerous capillaries, here and there occasional deposits of pigment. Supporting this newly formed connective tissue is a layer of mature connective tissue. The boundary between the two is marked by frequent deposits of brown pigment, for the most part located about the blood-vessels. Much of this is deposited in the spindle cells. Attempts to demonstrate iron in this pigment were unsuccessful, probably owing to the method of hardening (formalin). In the deeper portions of the layer of fibrous connective tissue nuclei are very rare, intercellular substance predominating. Beneath this layer of dense, fibrous, connective tissue is a more loosely arranged fibrous structure containing a certain amount of fat tissue. Interposed between the bundles of connective tissue are numerous large blood-vessels. Surrounding this is a layer of muscular structure. Nothing not already learned with low power could be detected by examination under high magnification. The pigment is in the form of oval bodies and plates, and much of it lies between the cells. The young connective tissue upon the surface presents the appearance commonly found in organizing exudates.

Section taken from the wall of the cyst at the point where it becomes continuous with the upper end of the femur stained with

hæmatoxylin alizarin. At the margin of the preparation is a mass of bone which shows an irregular, comparatively smooth contour. At certain points there are projections of smoothly shaped trabeculæ extending into the adjoining connective tissue. Along the smooth margin of the bone are well-defined osteoblasts in considerable number. The connective-tissue structure immediately adjacent to the bone closely resembles the appearance of normal periosteum, but in the portions which constitute the larger spaces between the newly formed trabeculæ this tissue presents evidence of myxomatous degeneration (Fig. 3). Here and there evidence of fat cells in the tissue may be detected. The bone corpuscles are irregularly formed and the canaliculi are poorly developed, for the most part wanting. At one point in direct apposition with the lamellated bone is a deposit of dark-brown pigment similar to that found in the portion of the cyst wall already described. The connective-tissue structure between the trabeculæ consists of slender connective-tissue elements and, except where it has undergone the myxomatous change, closely resembles normal periosteum. Separating this structure of trabeculæ is a layer of dense fibrous connective tissue containing a considerable number of blood-vessels. The direction of the connective-tissue cells in this zone is parallel to the surface of the cyst cavity. Upon the surface of the cyst is a thin layer of fibrin. In some portions this is undergoing organization, the young connective tissue containing extensive deposits of pigment, as in the other portion of the cyst wall.

Sections made from various other localities in the cyst wall fail to develop any radical difference in the structures already described. A large number of sections were made from the mass of spongy tissue protruding into the cavity from the anterior inferior portion of the cyst. Most of these revealed a connective-tissue structure surrounding cavities filled with red blood-cells and containing extensive deposits of pigment. After a prolonged search, a portion of tissue somewhat lighter in color than those already examined was found, and this, on microscopic examination, presented points of great interest (hæmatoxylin eosin). The structure in this case presents an appearance which would justify the diagnosis of sarcoma (Fig. 4). The tissue has been the seat of frequent hæmorrhages; but where the structure is not obscured, it is composed of spindle and oval elements, vary-

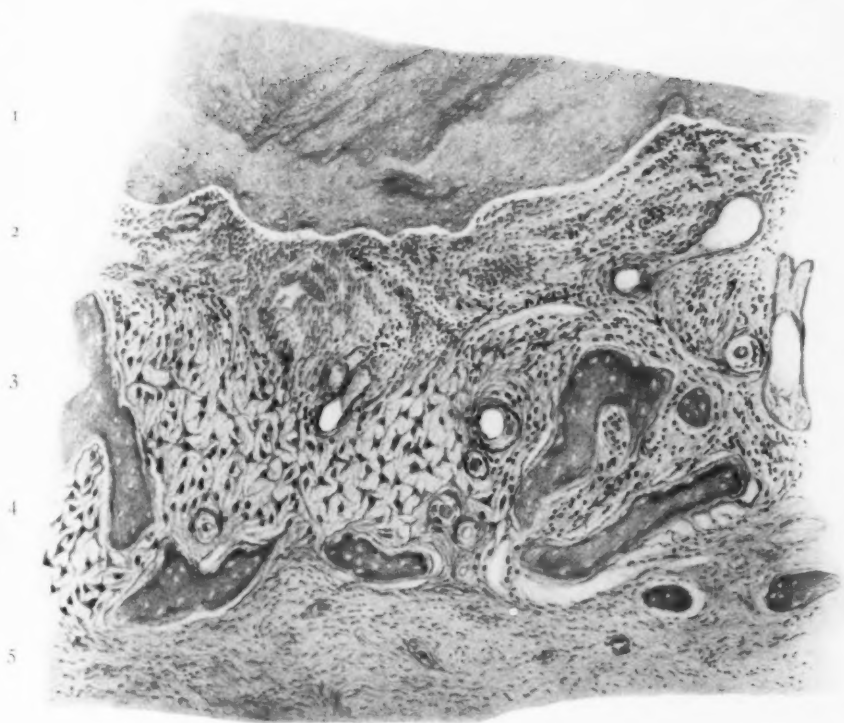


FIG. 3.—(Haematoxylin alizarin.) Section through end of shaft of femur, point *a*, Fig. 2. At 1, newly formed compact bone; 2, spindle-celled connective tissue with deeply stained nuclei; 3, isolated deposits of compact bone; 4, myxomatous tissue; 5, fibrous connective tissue forming wall of cyst.

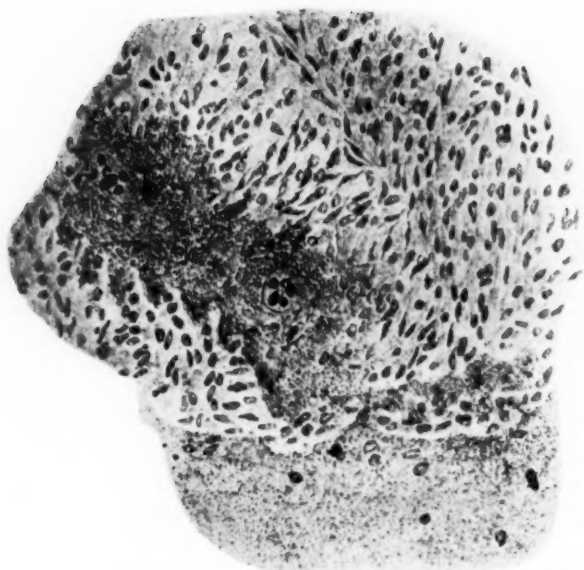


FIG. 4.—Section through sarcomatous tissue removed from point *a*, Fig. 1. (Formalin hardening, hæmatoxylin eosin.) Spindle-celled sarcomatous structure and two giant cells. The darker portion represents area of hæmorrhage.

ing in size, with deeply stained nuclei. The cell bodies are not sharply defined one from the other. Running through the structure are large, thin-walled blood-vessels. At the margins of the connective-tissue structure are found occasional giant cells. These are oval or spherical in shape, do not vary greatly in size, and have an average diameter of thirty microns. They contain from four or five to as many as twelve oval, deeply stained nuclei, which are usually arranged at a point midway between the centre and the periphery of the cells. The spindle and oval cells of the tissue structure along the margin contain frequent deposits of pigment. The characteristic appearance of the spindle and oval elements of the structure leave no doubt that we are here dealing with sarcoma.

From an analysis of the microscopic findings, as well as the anatomical relations in this case, the conclusion may be justifiably reached that the tumor was originally a sarcoma developing at or near the site of the original fracture, probably in the medulla of the bone, indicated by the marked distention of the shaft of the femur and the presence of giant cells in the sarcomatous tissue. The status of the structure at the time of the examination, especially the conditions found at the ends of the femur, where these become continuous with the wall of the cyst, indicates a considerable reparative progress on the part of tissues involved. It is highly probable that the entire cavity was at one time filled with sarcomatous tissue. This is represented by the mass protruding into the cavity from the lower inner aspect. The difficulty we experienced in detecting sarcoma indicates that the process was only active in a very small portion of this mass of tissue. In reality, we had continued our search to a point where we had practically concluded that there was no sarcoma present, when we ultimately came upon a small area of sarcomatous structure which gave us a clue to the true nature of the process. It is fair to assume that the sarcomatous process in this case was practically subsiding, as in the case of Roughton already quoted.

In the light of this experience it would seem wise to reconsider the five original cases quoted by Richet and Volkmann

and the three cases subsequently published by Pillot and Anger, Wythe and Oehler. It has already been pointed out that the microscopic examination in two of the original five cases was wanting. In the three remaining cases it must be remembered that microscopic diagnosis was at the time of these publications on a much less accurate basis than at present. With regard to the three recent cases, a serious question will be raised as to the interpretation of the respective observers. In the light of our own case, we are inclined to believe that it is not impossible that the inability to detect sarcoma in some of these cases is due to insufficient search in cases in which sarcoma is actually present; that in the other cases where sarcoma is not found after adequate investigation, it is not impossible that the tumor was originally of sarcomatous nature, and that the characteristic structure had disappeared. A factor which must be of importance in the development of these large cystic cavities is the frequency with which extensive hæmorrhages occur in the substance of the tumor. The effect exerted upon the sarcomatous tissue by these extravasations of blood, especially when the whole tumor is encased in a shell of bone, must so interfere with the nutrition of the cells as not only to impede their growth, but in many cases to lead to their complete disintegration. This is well evidenced in the status found in the sarcomatous tissue in our own case (Fig. 4). With the disintegration and removal of the tissue, the cavities formed, being already in communication with the smaller blood-vessels, become filled with fluid blood. With the progress of development of these cavities in the tumor, larger arteries, when in the immediate neighborhood, are ultimately involved. It is to be noted that on the posterior aspect of the cavity, in our own case, were two large vessels completely isolated, but which were at the time of the operation intact. Pulsation was not present in this case, but it may be readily conceived that a rupture of either of these larger branches would have resulted in the development of this phenomenon. Communication with larger vessels in the cases in which pulsation and a bruit were present was probably established in a similar manner.

Through the repeated recurrence of hæmorrhage, the sarcomatous tissue can be reduced to a minimum, or, as in the case of Roughton, entirely disappear, and the affection terminated by a form of spontaneous cure.

With the experience gained in our own case and after a review of the cases in the literature which constitute the claims of this affection to special consideration, we are inclined to the view that in all probability the greater portion, if not all, of the cases of bone aneurism were originally medullary sarcomata; and we would conclude with Gentilhomme that, while these tumors may present the characteristics of aneurisms, their etiology and the mechanism of their development have little in common with that affection. It is, therefore, desirable to decide whether the term "bone aneurism" should be continued in the literature, or whether we should refer to these cases as pulsating sarcomatous hæmatoma of bone.

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GUNSHOT WOUND OF THE LONGITUDINAL SINUS.¹

RECOVERY WITH HEMIANOPSIA AFTER TREPHINING.

BY B. FARQUHAR CURTIS, M.D.,
OF NEW YORK,

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Surgeon to St. Luke's and Bellevue Hospitals.

J. McC., forty-two years of age, born in the United States, hotel clerk, was admitted to Bellevue Hospital, June 2, 1902. He had been a periodic drinker and extreme smoker, but has always been well with the exception of an attack of rheumatism, lasting two weeks, about twelve years ago. He is a widower and denies venereal disease.

About three o'clock on the afternoon of June 2, 1902, he was shot during a raid upon a pool-room, the person firing the shot standing behind and considerably below him at a distance of fifteen or twenty feet. The pistol used was of large caliber. The patient lost considerable blood, but the hæmorrhage was controlled by pressure, and he was brought to the hospital in an ambulance.

At eight o'clock, examination showed a wound in the median line on the back of the head penetrating the skull. Patient complained of severe headache, but was able to walk, and had no evidence of anæsthesia or motor paralysis. He complained of dimness of vision, and the eyes were kindly examined for me by Dr. A. E. Davis, whose report states, "There is complete blindness of the right half of the visual fields, which are cut off in the median line. Vision in the left half of fields is R. = $\frac{15}{20}$, L. = $\frac{15}{60}$; pupillary reactions are normal and Wernicke's symptom is absent. There are no motor disturbances of the ocular muscles. The fundi are normal, there being only a slight congestion present."

Operation. Ether Anæsthesia.—An incision was made in the median line over the occipital bone, and the skull exposed by elevating the periosteum on each side. The opening in the bone lay just below the external occipital protuberance, and was about

¹ Read before the New York Surgical Society, December, 1902.

half an inch in diameter. Fragments of bone were lying just within the skull with portions of hair adherent to them, and there was a wound of the brain in the same line. After picking out several small bony fragments with forceps, the removal of one of the pieces was followed by profuse venous hæmorrhage, the blood coming out in a stream nearly half an inch in diameter and rising to some distance from the skull, indicating a wound of the longitudinal sinus. Narrow strips of iodoform gauze were packed in the wound, but it required a considerable amount of gauze to control the hæmorrhage, and even then the control was not complete. A trephine button of bone nearly an inch in diameter was removed on the left side and slightly above the gunshot opening in the skull, leaving a narrow bridge between, but such furious hæmorrhage again set in that fresh packing was inserted. Another opening was made in the median line below the gunshot wound, the chisel being employed instead of the trephine, and when the dura was reached, this opening was connected with the gunshot wound and with the other trephine opening by rapidly removing the intervening bone with the rongeur. It was then seen that there was a wound in the longitudinal sinus, and that it must be near the torcular Herophili. Nevertheless, an attempt was made to close the sinus by sutures passed deeply beneath it with a curved needle. These lessened the bleeding, but did not entirely arrest it. Narrow iodoform gauze strips were therefore inserted in the wound in the sinus, which was by that time a slit an inch in length, one end being thrust backward and one forward; more packing was placed in the wound and the soft parts drawn firmly together over the gauze by sutures. The patient was nearly exsanguinated, and 1500 cubic centimetres normal salt solution were thrown into a vein of the arm. The patient was sent to bed in fair condition and reacted well. The only wound in the dura was that made by the bullet perforating both walls of the sinus. The opening in the bone finally was one and one-half by two inches.

June 3. Patient lay quiet and seemed unconscious, but was easily aroused. He complained of total blindness. Highest pulse, 94, and temperature, 102° F.

June 4. Patient brighter. Dr. Davis found him able to count fingers at ten feet, and with a perception of colors apparently normal, using, however, only the left half of the visual fields

(nasal right and temporal left eye). The pupils were a little sluggish to light. Highest pulse, 120; temperature, 101° F.

June 5. Highest pulse, 84; temperature, 101.4° F.; leucocytes, 8200. He seemed quite rational, sleeping well, and needing no drugs. Previously he had complained much of headache, and needed morphine and bromides.

June 6. The external dressings have been changed daily on account of free bloody oozing. To-day two of the sutures were removed to lessen the pressure, without increase of the discharge. Highest pulse, 80, and temperature, 101° F.

June 7. Highest pulse, 76, and temperature, 100.2° F. (After this date the temperature remained below 100° until the 21st.) He had much pain and seemed dull and sleepy, and occasionally delirious. Dr. Davis found "some indications of optic neuritis in the right eye, the retinal veins being swollen and tortuous, the outline of the disk being obliterated, and the nerve-head somewhat elevated. The fundus of the left eye was apparently normal, although the veins were somewhat distended."

June 11. Dr. Davis reports "distinct papillitis in right and beginning papillitis in left eye." Some of the packing was removed from the wound without hæmorrhage.

June 14. Dr. Davis reports "papillitis well marked in right eye, and moderately so in the left. Some hæmorrhages near the disk in the fundus of each eye, apparently due rather to transudation than to rupture of the blood-vessels." More of the packing was removed. The patient remains in the same apathetic or mildly delirious condition, having morphine occasionally for headache, but no bromide.

June 15. Very restless. Morphine and bromides both necessary.

June 16. Nearly all the packing removed. Patient very restless, moaning, delirious, trying to get out of bed. He had to be coaxed to eat, but slept well, and required no morphine. His bowels have been moving daily with laxatives.

June 17. All packing out of the wound, which has escaped infection. No hæmorrhage. Patient quieter, but shows mental confusion.

June 18. Skiagram taken showing bullet to have ranged directly forward and to be lodged about two inches from the occiput, a little to the *right* of the median line. [A later skiagram,

taken in January, 1903, showed that there was an error in this, and the bullet really lay to the left of the median line, where we would expect it to be, judging from the right-sided hemianopsia.]

June 19. Patient very delirious, talking all night and pulling off his dressings. Hyoscine given.

June 20. Very delirious, refusing food and medicine. Pulse, 90; temperature, 99.4° F. Consultation with Professor Edward D. Fisher. The choked disk and severe mental symptoms, with continuous temperature between 99° and 100°, were supposed to indicate beginning suppuration in the brain along the track of the bullet, and exploration was determined upon. Chloroform was given and anæsthesia continued by ether. The opening in the bone was enlarged on the right side, the dura incised over the right hemisphere, and careful search made for the bullet with Flührer's aluminium probe and with Girdner's telephonic instrument, but without success. No evidence of infection or of damage to the brain was found. The wound was closed by suture, with rubber-tissue drainage from the dural cavity.

June 21. Temperature, 100.4° F. Sleeps much, but complains of pain in the head. At times he is restless and tries to get out of bed.

June 22. Patient is quieter and rational at times. Complains when the dressing is done. Temperature, 99.6° F. At night he was very troublesome, and slept only after hyoscyamine and morphine had been given.

June 23. Very troublesome, restless, destructive, and noisy all night.

June 24. Violent.

June 25. Refuses food.

June 26. Very noisy at night. Eats better, but pulls off dressing and picks at bed-clothes.

June 27. Patient has not slept. Very troublesome.

June 28. Slept fairly well. Quiet all day.

June 29 to July 4. Patient has been brighter, quieter, and easier to manage.

July 4 and 5. Very restless and troublesome, and had to be restrained. Temperature, 100° F.

July 6. Quieter. He remained about the same until August 5, when there was a marked improvement. The drain-sinus was entirely healed about August 1.

August 12. Although quieter, the patient has been completely irrational until midnight to-day, when he suddenly regained his senses, recognized the house surgeon, and talked with him about an hour. He complained of his eyesight.

August 13. Suddenly relapsed into his old state of irrational and restless behavior.

August 14. Up in a chair.

August 18. Patient again suddenly recovered his senses and recognized his friends. From that time on he retained consciousness, but remained very nervous for two or three months.

August 30. Discharged from the hospital, cured.

September 30. Dr. Davis reports "patient carries head to right side most of the time, as he sees better that way, although he can turn head to left side and see better than when looking directly ahead. R. V. = $\frac{20}{15}$, L. V. = $\frac{20}{15}$. Not improved. No astigmatism. No paralysis of any kind. Pupil normal in size and reaction. Right side of each field is cut off vertically and about five degrees to the right side of the median plane in each. He can see dimly the motion of the hand in right side of fields of vision. Patient sees better by holding head slightly to right or left. No central scotoma. Perception of colors normal in the left half of fields."

The most important lesson to be learned from this case is the great danger of removing fragments of bone from a fracture over one of the cerebral sinuses. This danger is seldom mentioned, but has been pointed out by Wharton in his article in the *ANNALS OF SURGERY*, xxxiv, 1901. But even he has not emphasized this fact as it deserves. Wharton collected seventy cases of wounds of the sinuses, and found the superior longitudinal involved in forty cases. In forty-five cases of fracture of the skull (including gunshot wounds) in which the sinuses were injured, as tabulated by Wharton, I find that in twelve cases no attempt was made to remove fragments or foreign bodies. In sixteen of the remaining thirty-three cases severe hæmorrhage was produced by removal of the bony fragments or foreign bodies from the wound. In five other cases, although details are wanting, the fragments of bone lodged in the sinus apparently prevented the escape of

blood from that vessel. It appears, then, that in over one-half of the cases of such injuries the hæmorrhage is controlled by fragments lodged in the sinus. The breach in the skull is seldom large enough to permit of easy access to the sinus, and there is danger of great loss of blood if the hæmorrhage begins again and continues while the surgeon is enlarging the opening in the skull. There is also danger of serious damage to the brain when forcible packing is resorted to in order to control the hæmorrhage from the sinus before the opening is enlarged sufficiently to allow of careful insertion of the packing material. The deduction is obvious that the fragments should not be disturbed until sufficient bone has been removed to give the surgeon complete command of the bleeding point.

A second practical lesson is the importance of marking every X-ray plate so that right and left cannot be confused. It is not enough to depend upon the usual rule to place the gelatine side of the plate next to the object to be photographed. The operator may fail to do this, or possibly the plate may be turned wrong in the envelope in which it comes from the factory. Metal letters or some similar object should be so placed as to be photographed upon the sides of the plate. Owing to the error made by the radiographer, an experienced professional, we failed to find the bullet in this case. (NOTE.—The skiagram taken June 18, and a second taken by another operator before the patient left the hospital, both indicated that the bullet was in the right side of the brain. After this paper had been read, I obtained a third skiagram, properly marked "R" and "L," showing the bullet on the left. This finding necessitated partial revision of the paper, omitting some remarks upon the contradiction between the skiagraphic evidence and the physiological rule of crossed paralysis of vision. The third skiagram and the patient were shown at the meeting at the Surgical Society held February 25, 1903.)

Fortunately, no harm seems to have come of this error, for the patient has recovered and remains well, the missile apparently having been harmlessly encapsulated. There can be no question as to the advisability of the exploration which

was made when the alarming mental symptoms, slight fever, and choked disk are taken into consideration. I still wish that I had succeeded in removing the ball, as it is possible that it may give rise to a dangerous condition in the future.

Severe head symptoms continuing as long as in this case are not infrequent after serious damage to the brain, such as often accompanies extensive fracture of the skull, and recovery from this condition is not unusual; but it is certainly uncommon to have the symptoms disappear so suddenly. The house surgeon, Dr. Love, states that the immediate return to a rational condition was startling. It is well not to be pessimistic in casting a prognosis in cases of this kind, for recovery may take place even in those which appear to be most hopeless.

**THE ORBITAL ROUTE FOR REMOVAL OF THE
SECOND BRANCH OF THE FIFTH NERVE
AT THE FORAMEN ROTUNDUM.**

BY ANSEL G. COOK, M.D.,

OF HARTFORD, CONN.,

Surgeon to the Hartford Hospital.

THE superior maxillary, or second division of the fifth nerve, leaves the cranium through the foramen rotundum. It then crosses the sphenomaxillary fossa, enters the orbit through the sphenomaxillary fissure, traverses the infra-orbital canal in the floor of the orbit, and appears upon the face at the infra-orbital foramen, where it divides into a number of branches, which spread out upon the side of the nose, the lower eyelid, and upper lip.

Neuralgia caused by disease of this nerve or any of its branches can be cured, in many instances, by section of the nerve where it leaves the cranium at the foramen rotundum, and complete removal of the whole nerve peripheral to the foramen.

A simple, safe, and efficient method to effect this was originated by the late Dr. Melancthon Storrs, of Hartford, Conn., who cut the nerve on the outside of the foramen rotundum, removed a section of an inch and a half, and brought the distal end of the nerve into the mouth, between the alveolus and the upper lip, leaving the divided ends of the nerve some three inches apart, and the lower portion turned in a direction away from the upper. It is inconceivable that these divided ends could ever reunite.

Dr. Storrs was a surgeon of more than local reputation, whose skill and judgment were respected throughout the State of Connecticut. His exact technique in performing this operation is not well understood. His idea was always the same, but his method of operating different in different cases. He perfected his methods and his special instruments as he gained greater experience.

The operation which I am about to describe may be relied upon as the perfected Storrs's operation.

I had the honor of assisting Dr. Storrs three times at operations on living subjects, and spent considerable time with him in devising and remodelling instruments, in experiments on the cadaver, and, finally, at his request, I did the operation on a cadaver, under his eye, that he might satisfy himself that I thoroughly understood it, and that the knowledge of his method would not die with him.

Dr. Storrs operated on some ten or twelve patients, none of whom died, directly or indirectly, as the result of the operation. One woman lost the sight of an eye, but I have been told by her oculist that this was not owing to the operation, and that the pain did not return.

Two patients whom I knew personally remained cured for over ten years. One has since died, and the other has had no return of the pain. I have heard that three or four of the patients had some recurrence of pain after two or three years, but to what extent it is impossible to say accurately. I have investigated the case of one patient who was said to have relapsed, and found that he had suffered severe pain in other nerves, but not in the second division of the fifth nerve, which Dr. Storrs removed.

A well-known case was that of the late Roland Mather, of Hartford. Mr. Mather was seventy-six years old, had suffered severely for fourteen years, and had consulted many physicians at home and abroad. It is safe to say he had tried everything but an operation.

Dr. Storrs operated on Mr. Mather in November, 1886. The cure was complete. Mr. Mather died in May, 1897.

In the three years which have elapsed since Dr. Storrs's death, I have had but one opportunity to perform the operation, which I did successfully at the Hartford Hospital in December, 1902. The patient was a woman of sixty, who had suffered for one year, the last four months of which she was in constant agony. The operation gave her immediate and absolute relief, which has continued up to the present time.

A description of the operation is as follows:

Technique of the Operation.—Place the patient half reclining in a rocking-chair, wedged with sand-bags. The operator seats himself on a stool facing the patient, on the side of the eye on which he intends to operate. One assistant is necessary to give the anæsthetic, and a second to hold the retractor.

The lower edge of the orbit can be easily felt through the skin. Make a clean incision along this edge, from the inner to the outer angle of the orbit, through the tissues, including the periosteum, down to the bone. Then with a blunt instrument carefully elevate the periosteum from the floor of the orbit, going well back and exposing the sphenomaxillary fissure. Lift the eyeball out of the way with a spoon-shaped retractor inserted under the periosteum. Usually a bluish spot will appear, showing the situation of the infra-orbital nerve, covered by a thin plate of bone, in its canal in the floor of the orbit. Should, however, there be any difficulty in locating the nerve, it can easily be done by passing a probe into the infra-orbital foramen and up into the orbit. Having located the nerve, with a chisel or any suitable instrument crush the thin plate of bone covering it. The nerve can then be easily hooked up and brought to view. The infra-orbital artery is usually torn at this time, and bleeds for a few moments; but it is of no importance, and will soon take care of itself.

Having hooked up the nerve, ligate it securely with a piece of silk passed around it with an aneurism needle. Then cut the nerve, leaving the ligature fastened to the proximal end of the cut nerve. We now have the nerve under perfect control. By making a slight traction on the ligature, we can bring the nerve into view, and by following it on can readily crush down the thin wall of the canal, removing the bone fragments with suitable forceps. When the nerve enters the sphenomaxillary fissure, it passes out of the bony canal, and is only surrounded by soft structures, which can easily be hooked or wiped away.

Should the sphenomaxillary fissure be narrow, and not readily admit the introduction of instruments, it can easily

be widened by inserting a suitable blunt instrument, and by wedging or widening the walls. It is remembered that the upper wall of this fissure is the strong wing of the sphenoid bone, and that the lower angle is the thin wall of the antrum. If either bone should break in these manipulations, it would be the wall of the antrum which would be crushed down and out of the way, and would cause no trouble.

Having the nerve thus free to the foramen rotundum, next slip the ends of the silk ligature through a loop of wire, held with a small snare. (The Jarvis snare of the rhinologists.) The loop of wire in the snare is passed down the nerve to the foramen rotundum, just as a tunnel sound is passed over a filiform bougie. When the loop of wire reaches the foramen rotundum, it is closed, and the nerve is cut and removed.

To return now to the distal end of the nerve. Separate the integument from the bone down to the infra-orbital foramen, gather up with a hook the mesh of nerves going to the cheek, and drag the divided nerve through the foramen. Storrs then put the nerve into the loop of a threaded needle and carried it down into the mouth, leaving the end which had been in the infra-orbital canal suspended between the alveolus and the upper lip; this end he cut off even with the mucous membrane. This was for the purpose of preventing any possible restoration of any communication between the peripheral branches of the nerve and the stump left at the foramen rotundum.

To complete the operation, place a small gutta-percha tissue drain in the track of the nerve, extending from near the foramen rotundum to the surface. Suture the skin wound. The drain should be removed at the end of twenty-four hours.

In behalf of this operation, I would say that it is very safe, simple, and can be performed on elderly and feeble people with but little shock. The relief is immediate in all cases, and a permanent cure is effected in many. The scar is insignificant, and the patient is not confined to his bed for more than a week.

Its exact value can only be determined when more patients have been operated on and the results more carefully noted.

**I. TUBAGE OF THE PHARYNX FOR FACILITATING
THE ADMINISTRATION OF ANÆSTHETICS
AND PREVENTING THE INHALATION OF
BLOOD IN CERTAIN OPERATIONS ON THE
MOUTH AND FACE. II. A HOT-WATER BED
FOR THE OPERATING TABLE.**

BY GEORGE W. CRILE, M.D.,

OF CLEVELAND, OHIO.

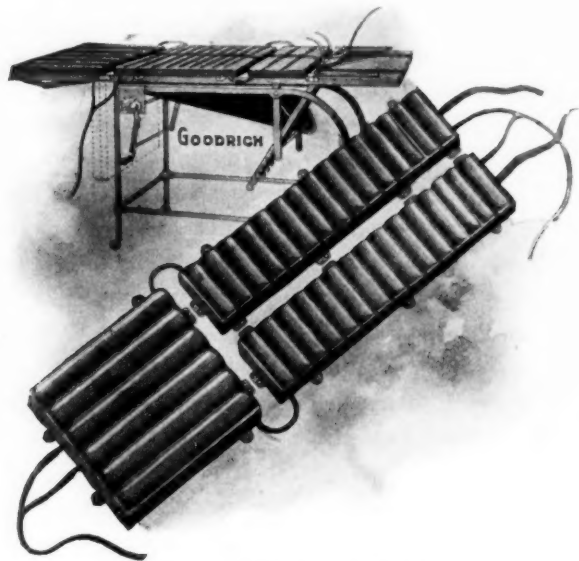
I. IN operations within the mouth, on the jaws, and on the nose, two distinct difficulties are encountered,—the prevention of the inhalation of blood, and an even administration of the anæsthetic, without encroaching upon the field of operation. For about a year the following method intended to obviate both difficulties has been employed:

1. The patient is reduced to full surgical anæsthesia.
2. The pharynx is cocainized.
3. Two drain-tubes as large as possible are passed through the nares to the level of the epiglottis; the tubes are then severed at an equal distance from the nose.
4. The mouth is well opened and the tongue drawn out.
5. The entire pharynx is then packed with rather large pieces of gauze.
6. If thoroughly done, the base of the tongue is carried well forward, and an air-chamber with which the rubber tubes and the larynx communicate is thereby formed.

The anæsthetic is administered entirely away from the field of operation. The patient may be placed in the position most advantageous for the operative technique regardless of the blood. In operations upon the tongue, the pressure against the base is sufficient to control most of the hæmorrhage until the lingual arteries are severed. In cleft-palate operations, not only is there no spraying of blood and mucus, but the field of operation is kept much cleaner. The mucus that usually

forms in the throat is absorbed by the gauze. The anæsthetic may be as evenly administered as in operations upon other parts of the body. A funnel may be attached for still further facilitating the administration of the anæsthetic.

II. The meagre protection of patients against damp and cold during operations constitutes a weak point in the management of surgical operations, particularly in the winter and spring time. In my own service I have encountered a number of cases of pleurisy, bronchitis, and a few cases of pneumonia following operations. The greater portion of these



Hot-water mattress for operating table.

could be attributed to the operation only so far as the patient was subjected to exposure to cold and damp.

Aside from these sequelæ having more or less risk to life, a great many patients have complained of pain and stiffness in the muscles of their backs following operations.

In conjunction with the Goodrich Rubber Company such a water-bed was devised. This bed is made of the best quality of rubber, in many compartments, so as to fit the top of the

table and permeate all the various points without interference. The tubing attached to the hot-water bed is so arranged that it may be attached to the hot-water tap, and a flow of hot water directed through it and drained from the other end.

A number of useful suggestions were made by my operating-room nurse, Miss Pringle. It was found best on the morning of operations to allow hot water to circulate freely through the rubber bed for half an hour or more, thereby warming the entire top of the table. It was not found necessary to have a continuous flow of hot water during operations, since a previous warming and a generous filling of hot water prior to the operation were sufficient to keep up a good temperature for several hours.

This bed has been in use in Lakeside Hospital during the past year. It is certain that during that time patients were less chilled, and the postoperative sequelæ alluded to above were apparently considerably lessened.

**THE DROWNING OF PATIENTS IN FÆCAL
VOMIT DURING OPERATIONS FOR IN-
TESTINAL OBSTRUCTION AND
SEPTIC PERITONITIS.¹**

BY E. WYLLYS ANDREWS, M.D.,
OF CHICAGO.

A PATIENT may be killed by drowning in fæcal vomit while unconscious on the operating table or semiconscious after anæsthesia. The utter collapse which follows ileus of any origin favors this accident of flooding the air-passages, so that it probably occurs rather often. I do not wish to invoke this as a sole cause of sudden death or to ignore such other causes as toxæmia, myocarditis, embolism, or pulmonary œdema, but will describe two plain cases of death by suffocation which I have seen myself.

CASE I.—A young man, aged eighteen years, patient of Dr. McGaughey, was operated upon at Mercy Hospital for acute suppurative appendicitis. The general peritoneum was infected, and a large amount of pus was removed, after which the cavity was irrigated and a Mikulicz gauze drain inserted. This patient was returned to his room in fair condition. About fifty or sixty minutes after the operation I visited his room, where he had been attended constantly by a nurse. His consciousness had returned, and nothing unusual had occurred until, a moment before I chanced to reach his bed, he choked a little and ceased breathing. He was cyanotic and gasping as I entered, but did not vomit or retch. The pulse was full. Separating the teeth and drawing the tongue forward, I found his nose and mouth full of fluid fæcal vomit. None had escaped, and there was no cough. I lowered the patient's head by hanging his shoulders over the side of the bed, when large volumes of brownish fluid ran in streams from his mouth and both nostrils. When this ceased running, his body was rolled, and then still more elevated and artificial

¹ Read before the Chicago Surgical Society, March 2, 1903.

respiration kept up. The pulse soon ran down, and he died without ever breathing naturally again, or seeming to get any oxygenation from the forced breathing. He was practically dead when I saw him, although the heart beat a moment longer. Such a death might have been thought due to the anæsthetic had it occurred on the table. Of course, it is possible to assume that it was a cardiac case or a pulmonary embolism, and the flooding only an incident, but I believe it to be one of drowning, for reasons stated below.

CASE II.—An infant patient of Dr. McCleary had complete mechanical obstruction, for which I was called to operate, my diagnosis being intussusception of the ileocæcal valve. While making preparations for this operation about twelve hours after the obstruction began, slight cyanosis and choking were noticed in connection with fæcal vomiting, which was rather constant. About sixty seconds after the patient was laid upon the table, and almost with the first breath of ether inhaled, the patient ceased breathing and became suddenly cyanotic. The pulse disappeared, and, when the body was inverted, immense quantities of brownish fluid ran from the nose and mouth. Artificial respiration failed to restore this patient. An autopsy was then made, and an easily reducible invagination found at the valve.

Dr. L. A. McArthur allows me to quote two instances of drowning by vomit in his service at Michael Reese Hospital. One of these occurred at the beginning of anæsthesia, and the other just at the moment of making the abdominal incision. Both died quickly, with sudden failure of respiration and an immense outpouring of fæcal fluid from the nose and mouth, so that the operator was convinced that they were cases of suffocation or drowning. Dr. A. D. Bevan has kindly furnished me with another instance of this accident. This death occurred during an operation for gastro-enterostomy under chloroform anæsthesia, the patient dying on the table with the air-passages flooded with brownish fluid, which he apparently had lost the power of expelling.

I am also indebted to Dr. William E. Morgan for three typical cases seen by him. One, a corpulent man, during operation for intestinal obstruction, suddenly regurgitated a fluid

of brownish color, which was drawn into his trachea, causing quick suffocation. I chanced to be present and saw this death. A second case was one of gastric carcinoma operated upon by Drs. Fenger and Morgan which died on the table by this same outpouring and drowning accident. The stomach had not been washed out. A third case of Dr. Morgan's, while being operated upon in a suburban town for bowel obstruction, had, to quote his language, "a faecal explosion," strangled, and died on the table with the lungs full of the fluid vomit.

I am now, therefore, more than ever confirmed in the belief that this accident of drowning is an ever-present danger in septic laparotomies. The mechanism of this accident seems to me to be as follows: We will assume that the careful surgeon has washed out the stomach in these cases, yet starting with an empty stomach does not insure its remaining empty. Nothing has impressed me more than the enormous collections of fluid in large and small bowel obstructions which accumulate in the intestine. I have observed this particularly in opening the abdomen in late cases of obstruction. Although everything taken by the mouth is vomited, still, in these cases, fluid accumulation goes on, so that the paralyzed and distended bowel contains much more liquid than gas. In a few cases where I drained the bowel by artificial anus or to facilitate handling, I have been amazed at the quantity poured out. Sudden access to the stomach from this great receptacle takes place, in my opinion, when the tonus of the pylorus and cardia is relaxed by extreme depression. Probably ether and chloroform toxæmia added to septic toxæmia abolish some reflexes ordinarily present, so that throat irritability is also lost, and no spasmodic expulsion occurs when the trachea and bronchi are flooded. Assuming this throat paralysis as probable, the ease with which a narcotized patient can be drowned in fluid vomit is appalling to consider.

The toxicity of this matter is so intense that even in the throat some absorption may take place, but, unless this poisonous influence is exerted locally, there is scarcely time for any

effect from it. The viscosity of the fluid, however, adds to its deadly, choking influence when it is forced into the smaller bronchi. There is scarcely any chance that such sticky, turbid matter can be expelled or drained out from the lung as pure water is known to do with changes of posture.

Conclusions.—1. Flooding of the air-passages by fæcal vomit is a real danger, and probably has caused many unexplained deaths. 2. Resuscitation is impossible or very difficult. 3. The fluid may flow by gravity through the relaxed stomach sphincters directly out of the intestine where it has accumulated in enormous quantities. 4. The accident occurs with great suddenness and with a stomach supposedly empty. The suffocation may be so complete that no outcry is made and may not be noticed by the attendant. 5. It may occur as late as an hour after anæsthesia, or at any time until consciousness is restored. 6. We have no evidence that it can occur during consciousness even *in extremis*. 7. After septic laparotomy, patients, when returned to bed, should be watched without even momentary intervals to full consciousness. 8. A suggestion made to me by Dr. McArthur, that as many as possible of such cases be operated under cocaine anæsthesia, seems to me sound in the light of the above report.

SPLENIC INFECTIONS.¹

WITH REPORTS OF TWO CASES RECOVERING AFTER OPERATION.

BY ALBERT L. STAVELY, M.D.,

OF WASHINGTON, D.C.,

Gynaecologist to Garfield Hospital.

AN infection of the spleen may be directly traceable to the introduction of septic material from without the body, where the thoracic or abdominal wall is injured coincidentally with the spleen.

After a local injury, where the skin remains intact and the spleen is contused or lacerated and the patient does not succumb to hæmorrhage, the intestinal bacteria may migrate and cause infection.

Sirleo reports the case of a man who sustained a contusion of the left side, followed by pain. Some time later the patient developed symptoms of obstruction and died. There was a septic peritonitis and an enlarged spleen which was adherent by its lower pole to the angle of the colon. In the interior of the spleen was an abscess cavity which had opened through the peritoneum into the intestine.

Bardenheuer speaks of a suppurating hæmatoma which contained a floating spleen.

Xarewsky had a patient, a girl of thirteen, who, some time after being thrown violently against a wagon, developed pains in the abdomen and fever. Tumefaction became apparent over the region of the spleen, and an incision was made, with the escape of a large amount of fœtid pus. The spleen was found completely separated from its capsule and removed.

Lampe and Goffe refer to similar cases. A gastric ulcer by contracting adhesions may infect the spleen, and inflammations of any other of the surrounding organs or tissues may by contiguity cause the same result.

¹ Read before the District of Columbia Medical Society, January, 1903.

In fatal cases of infection, hæmorrhages into the splenic pulp are common.

An abscess may result from an imported infection through the septic embolus, from tuberculosis, from twisting of the pedicle, from extension of infection from a perinephric abscess, a pyothorax or pulmonary abscess, gastric ulcer, from the exterior through an open wound or from laceration without external injury, from adhesions to intestines, and from involvement with pyogenic organisms of necrotic areas, such as we find in typhoid fever. It is rare in malarial fever.

Chondhoory in 30,000 cases saw only three with splenic abscesses.

Among the very rare causes is appendicitis. Three references are found.

Routier, a month after an operation for general peritonitis of appendicular origin, opened a splenic abscess.

Hagen incised a large peri-appendicular abscess without relief of the general condition; a month later the patient developed pain in the left flank, and intermittent fever, due to the formation of an abscess of the spleen.

Roffe had a young boy with contusion of the spleen, with recovery. Six weeks later he operated for appendicitis and peritonitis. At the autopsy, which occurred shortly afterwards, he found an abscess in the spleen.

In the last case, appendicitis, as the direct cause, is a little in doubt, as there was a preliminary injury to the spleen.

A very unique cause is circumcision done for phimosis. Shortly after operation the patient had febrile symptoms and diarrhœa and, later, pain and swelling in the region of the spleen.

An abscess may be multiple or single. The multiple abscesses are the result of infected emboli and are generally situated near the surface. They may by coalescence form a very large abscess, and when this occurs it is generally found in the upper half of the organ. An abscess developing from some purely local infection is usually single, and may reach a greater development than is found in the embolic form.

There is another kind where the whole spleen, from the intensity of the infection, is converted into a mushy mass of blood pus and degenerated tissue.

The pus from a spleen is usually dirty red or chocolate colored and contains shreds of disorganized splenic tissue. This is found especially where the spleen is converted into a purulent softened mass.

On the other hand, it may be like ordinary pus. One operator described it as a bluish-yellow fluid.

The constitutional symptoms of splenic abscess are in no way different from those of other abscesses. There may be some confusion from the complicating symptoms of the general disease, of which the abscess may only be a local manifestation. The local indications—swelling, fluctuation, tenderness, redness, a peritoneal friction sound—may be present in part or whole. The pain, which is not always constant, may be severe, sharp, and radiating, or dull and rather diffused. The existence of pain indicates some peritoneal involvement, though simple distention of the peritoneum in a large abscess is considered a possible cause in the absence of adhesions.

In general peritonitis—pyogenic or tubercular—the peritoneal investment of the spleen is involved.

An inflammation of the splenic peritoneum or perisplenitis is due also to local conditions, among which are intestinal and gastric ulcers, empyema of the pleura, infarcts, abscesses, acute splenitis, torsion of the pedicle, and tumors. The peritoneum is dull and congested, and oftentimes covered with patches of lymph more or less organized. Adhesions to surrounding structures are usually present.

In suppurative perisplenitis the spleen is encapsulated by the peritoneum of the parts adjoining and bathed or floating in a purulent exudate. This is observed in tubercular diseases. When the perisplenitis has existed for a long time the capsule becomes much thickened.

Perisplenitis not involving the whole surface may exist without involvement of the splenic tissue, as in the case of Sutton, where an abscess, due to perforation of the colon,

formed, in which the spleen constituted part of the abscess wall.

The outlook in an undisturbed splenic abscess is bad. Rarely it undergoes inspissation and calcification. Exceptionally it burrows its way along the line of least resistance, and ruptures into the peritoneal cavity, causing fatal peritonitis, or, what is more common, it discharges into the bowel, stomach, lung, or kidney, and forces its way out through one of the avenues furnished by those structures.

A case of spontaneous rupture externally has been reported. The treatment is incision and drainage or splenectomy.

The treatment is ordinarily successful where the spleen has contracted adhesions to the parietal peritoneum. Of thirteen cases so treated nine died. Where the abscess was situated high up, Lauenstein in one case resected the ninth rib and opened the abscess with a cautery. Splenectomy has been quite successful, too. Nine removals are recorded, three for suppurative perisplenitis, and two died, or 22 per cent. The three perisplenitis cases recovered. With most of the others there were complicating adhesions.

Some of the reports are interesting. Stewart (*Southern California Practitioner*, 1898) removed a large adherent spleen full of embolic abscesses. The patient died.

E. Collin cites a case where an abscess involving the entire spleen ruptured into the pleura.

W. C. Howe (*Medical News*, Philadelphia, 1893, lxiii, 405) had a patient, a man aged twenty-one years, well-digger, who had severe pain in the left hypochondriac region, with marked bulging over splenic area and a temperature of 102° F. After two months of various treatments, including cold, poultices, and quinine, the abscess was incised and two quarts of shreddy pus set free. About two weeks later he had a copious purulent movement, and a week later coughed up large quantities of pus. He finally recovered.

Hagen reported a case of abscess where the remaining splenic wall was so riddled with small abscesses that he cu-

retted it away, leaving only a small stump of tissue at the hilum. There was almost no bleeding.

Reginald Harrison described a man, aged thirty years, who some time after a severe fall developed shooting pains and swelling of legs, temperature of 100° F., and dulness over base of lung on left side; in region of spleen there was an increased area of dulness with pain and tenderness. The urine was normal. Finally, a decided swelling was noted, and increase of temperature to $102\frac{1}{2}^{\circ}$ F., leucocytosis, and fluctuation. He began to pass pus in urine. After three aspirations, and a final incision and drainage and removal each time of a large quantity of pus, the man recovered.

A case which I wish to report in this connection was referred to me by Dr. Charles Collins. I have reason to believe the diagnosis was splenic abscess with perforation of the kidney and discharge of pus "per urethram."

The history is as follows:

Mrs. W., white, aged thirty-three years, married, has been living in Washington.

Family History.—Father died at age of fifty-six of Bright's disease; mother asthmatic, otherwise in good health; three sisters living and well. History of tuberculosis on mother's side, two aunts dying of the disease.

Previous History.—Had measles and whooping-cough. Menstruation began at thirteen, regular, and in every respect normal; for three years had leucorrhœa; has had two children, one born in 1899, living and healthy; never has had any abortions; in 1899 had frequent micturition with burning, which lasted about three weeks. Since then up to the present attack the urine has been to all appearances normal.

Present Illness.—About Christmas, 1901, began feeling weak and suffering with pain and cramps in epigastric region, and later in the small of the back. From this time to July 6 had pain also in the left lumbar region. She contracted, as she said, "a heavy cold on her lung," with little cough and expectoration, but had very severe pain in region of left kidney, and was compelled to go to bed. On July 10, 1902, she emptied the bladder three different times, and each time the contents presented the charac-

teristics of nearly pure pus. Two days later she noticed more pus. The patient grew weaker and more anæmic, and the pain in the side changed to a soreness. Did not menstruate in January, and since then it has been scanty or absent. Appetite very poor, bowels regular. Slight hacking cough, with some greenish or whitish expectoration.

Examination.—A very anæmic woman, fairly well nourished, abdomen rather full, most prominent part to left of navel in the hypochondriac region. Here there was a decided resistance, marked pain, and soreness; this extending around into the flank; resonance along lower part of thorax in the epigastrium, dulness laterally and behind. Bimanually an indistinct, rather firm mass can be felt. Cervix uteri was dilated to exclude the possibility of a purulent discharge coming from the uterus. Her temperature before the operation ranged between 100° and 102.5° F. After the operation it still persisted, but seldom exceeded 101° . Her pulse before the operation ranged between 110 and 135; afterwards it continued rapid, only once or twice going down to 100. For a short time her condition was precarious. The urine and pus showed no tubercle bacilli after several examinations. The urine before the operation was yellow, alkaline, cloudy, and with specific gravity of 1017, containing epithelium and numerous leucocytes. For the three days following the operation it contained fine and coarse granular and hyaline casts in varying degree. After that they disappeared entirely. There was also an increase of the amount of albumen.

The last analysis, made eighteen days afterwards, still showed a few leucocytes. A blood count made before the operation gave 3,543,000 red blood-corpuscles and 38,200 white blood-corpuscles. Hæmoglobin, 46 per cent. There were no malarial parasites. Her condition at the time of operation was very bad, and no attempt was made to catheterize the ureters. An operation was performed July 23, 1902. A preliminary median exploratory incision was made. A large adherent mass was felt in the left hypochondriac region. The right kidney was movable and was situated below the level of the navel. It was regular in shape and smooth, but a little large. Two or three enlarged glands could be felt under the liver near the common duct. They were deeply located and would not admit of easy removal. The incision was closed. The patient turned on her right side, and a lumbar opening on the left side

was made extending from the ribs downward about three inches. An abscess sac was entered, from which discharged over a pint of yellowish, slightly odorous pus containing some shreddy material. The cavity extended between four and five inches above the thoracic margin. Below, a somewhat irregular prominent mass of tissue could be felt, which suggested the upper pole of the kidney. No sinus could be found. The cavity was irrigated with salt solution and closed, leaving a large drainage tube in place for future discharges or irrigation. As much as possible was accomplished considering her weak condition, and no attempt was made to explore the kidney. About a month after leaving the hospital she showed some decided improvement. She had slight daily rises in temperature and was still weak and anæmic. Seen four months later, the improvement was marked. The temperature ranged within a degree of normal, the pulse was slower, and she had been out several times. There was an increase of thirteen pounds in weight, and the only unsatisfactory condition was the existence of a small sinus from which discharged a little pus, enough to require the use of a dressing.

The following case possesses much interest on account of several unique features. The diagnosis is a complicated one, consisting of displacement of the spleen, malarial hypertrophy, hæmorrhage, suppurative perisplenitis,—infective splenitis,—thrombosis of splenic vessels, and infarction.

The history is as follows:

Mrs. W., admitted to Garfield Memorial Hospital, July 30, 1900, aged thirty-two years, white, domestic, was born in New York, and came to Washington at the age of five years, and has resided here ever since. Has had measles and whooping-cough. At the age of sixteen she had a severe and prolonged attack of malarial fever of the tertian type. Since the first attack, which lasted three months, she has had a series of mild recurrences. At the age of twenty-five she had rheumatism, which continued for six months. She has always suffered from indigestion, but particularly during the last year, when she noticed pain and a feeling of weight in the epigastric and left hypochondriac regions after eating. This lasted for about an hour and a half and was attended with acid eructations, and often with a sense of suffocation

and palpitation. Menstruation began at sixteen. The periods have been regular, lasting from four to seven days, rather profuse, and unattended with pain. She has had four children, the oldest twelve, the youngest two years. All her labors were normal. After the birth of the third child, eight years previously, her physician called her attention to a tumor which was located on the right side of the abdomen about on a level with the crest of the ilium. The growth was hard, about the size of a base-ball, and seemed larger when she was lying down, and possessed some mobility. She observed no especial change in its size until a year ago, when it underwent a gradual augmentation, and during the last month had become very large. The tumor has always been tender under pressure, and wearing of corsets or tight clothing was impossible. During the last year she had felt sharp shooting pains through it at intervals. Coupled with these was a severe burning sensation in the upper part of her back. Four years ago she had severe paroxysms of hypogastric pain, lasting from ten to fifteen minutes, during which she had to bend sharply forward. She has grown weaker and lost flesh for several years, but this has been especially marked during the last one. About two weeks before admission, June 15, 1900, she was attacked with violent pains in the region of the tumor, which lasted a week. Three days before admission to Garfield Memorial Hospital there was a recurrence of the pain, which became most intense, and subsequently tenderness developed through the entire abdomen. Her appetite had failed, and for a few days she was unable to retain nourishment, vomiting shortly after attempting to eat. Now she is able to retain food, but has gastric discomfort and acid eructations, an unpleasant taste and offensive breath. The bowels are constipated. There is inability to pass water, and when the attempt is made she had severe tenesmus. Resort to the catheter is necessary. She has no chest pains nor cough, but there is an excessive dyspnoea and palpitation on slight exertion. She worries easily, is of nervous temperament, has occipital headaches, and sleeps poorly. The temperature on admission at 3 P.M. was $100\frac{1}{2}^{\circ}$ F.

Physical Examination.—She is emaciated, has a sallow complexion, and is very anæmic. On inspection of abdomen there is a marked projection of the right half. On palpation, the firm, smooth, slightly convex surface of an abdominal growth can be

felt, extending from the ribs into the pelvis. Laterally, it reaches well into the flank and over to the linea alba. There is no fluctuation, and pressure in front imparts an impulse to the hand held behind. The area of normal splenic dulness is absent. Heart, lungs, and liver seem normal.

Per vaginam; the outlet is relaxed, the cervix high and small, and the uterus is pushed backward. On the left vaginal fornix the examining finger meets a firm resistance, and by carrying it further to the left, it encounters a sharply defined edge. A diagnosis of the hypertrophied septic malarial spleen was made and splenectomy decided upon. Through the kindness of Dr. Van Rensselaer I assumed charge of this case, and with his assistance the operation was performed August 6, 1900.

Operation, August 6, 1900.—Upon palpating the abdomen after etherization, a decided change in the physical characteristics was observed. The hard, smooth mass was replaced by a fluctuating one, and only after firm pressure could the original tumor be felt beneath the fluid layer. It was evident there had been a rapid accumulation of some kind of fluid. A median incision about six inches long was made through these adhesive walls. The omentum was adhering to the anterior wall, but the adhesions were light. Upon stripping the omentum free from the bladder to which it adhered, there was a copious discharge of dirty chocolate-colored fluid, the whole amounting to about a quart. After the removal of this fluid the correct condition was observed. There was a large sac lined with yellowish plastic material and containing a very large softened, dark, and degenerated spleen. A few adhesions between the spleen and sac on one side were freed and the hand passed around to get an idea of the size. It extended from the pelvis to the diaphragm, occupying most of the right side of the abdominal cavity. The spleen shelved out so as to make it impossible to expose its pedicle, which was short. The attachment was to the right side of the spinal column. A number of short vessels, within a space of six inches, could be felt, constituting the pedicle. The method adopted was to pass a ligature on a carrier and make a deep tie, then to clamp the vessel on the spleen side and cut between. The first step was accomplished without hæmorrhage, and the next vessel was treated in the same way. After cutting these the spleen could be raised so as to expose the rest of the pedicle. There was no

bleeding. The remaining vessels, five or six in number, were ligated under direct inspection, and the spleen removed without further difficulty. An examination showed a complete thrombosis of the splenic vessels, and there was not a drop of fresh blood lost during the removal of the organ. After a thorough cleansing of the sac, a portion of the thickened omentum was removed and the edge stitched to the parietal peritoneum so as to shut off the perisplenic sac from the intestines on the right. A drain was established through part of the wound in front and a counter opening for drainage was made in the side. The spleen after removal weighed 944 grammes, or about thirty ounces.

The sudden access of fluid noticed before the operation was undoubtedly due to an escape from the spleen of old blood due to an injury inflicted during some manipulation.

This mixing with a small quantity of purulent fluid already present accounted for the changed condition. The loss of blood, too, easily accounts for the decrease in size of the organ. There were no complications apart from a little pain and vomiting during the first twenty-four hours after the operation. Her maximum pulse-rate was 130. The highest temperature before the operation was $102\frac{2}{5}^{\circ}$ F.; the highest after, 102° F. It reached nearly normal in ten days, and fluctuated a little after that for about six weeks on account of some continued suppuration of the sac. After the operation, no hope was entertained of her recovery on account of the evident septic condition of the thrombi; but she recovered. Seen a year later, the improvement was so marked it was difficult to recognize her as the same woman.

A careful blood count was made before and after the operation. The effects of removing a functioning spleen are to increase the number of white blood-corpuscles and decrease the hæmoglobin and red blood-corpuscles for a time. After a varying period, the normal proportions are re-established, everything else being favorable.

In our case the following counts were made:

July 31.	Red blood-corpuscles	3,584,000	} 179
	White blood-corpuscles . . .	20,000	
	Hæmoglobin, 83 per cent.		
August 2.	White blood-corpuscles . . .	23,550	
August 3.	White blood-corpuscles . . .	25,666	

August	6.	Day of operation :			
		Red blood-corpuscles	3,820,000	}	168
		White blood-corpuscles . . .	23,200		
		Hæmoglobin, 75 per cent.			
August	7.	Day after operation :			
		Red blood-corpuscles	3,888,000		
		White blood-corpuscles . . .	24,308		
		Hæmoglobin, 75 per cent.			
August	8.	Red blood-corpuscles	3,044,000	}	184
		White blood-corpuscles . . .	16,466		
		Hæmoglobin, 65 per cent.			
August	9.	Red blood-corpuscles	4,003,920	}	240
		White blood-corpuscles . . .	17,094		
		Hæmoglobin, 65 per cent.			
August	11.	Red blood-corpuscles	4,580,000	}	384
		White blood-corpuscles . . .	11,916		
		Hæmoglobin, 80 per cent.			
The count showed a good deal of fluctuation.					
The last count made was on September 27 :					
		Red blood-corpuscles	4,176,000	}	344
		White blood-corpuscles . . .	12,125		
		Hæmoglobin, 80 per cent.			

These counts are not consistent with those obtained after the removal of a functioning spleen, and this is due to the fact that that organ was infected and non-functioning. Instead of an increase of the white-blood-cells and a decrease of the reds, the opposite occurred.

The hæmoglobin percentage was reduced about ten points to 65 per cent. for a few days.

The drainage tracks closed after several weeks.

The following is the pathological report, for which I am obliged to Dr. T. B. Nichols.

SEPTEMBER 5, 1900.

The spleen removed by operation from L. W., August 6, 1900, had approximately the shape of the normal organ, but was greatly enlarged to four or five times its normal size, weighing 944 grammes (about $31\frac{1}{2}$ ounces) and measuring 23.7 by 11.9 by 6.8 centimetres ($9\frac{1}{2}$ by $4\frac{3}{4}$ by $2\frac{3}{4}$ inches). It was soft and friable in consistency, and was intensely engorged and distended

with blood throughout its substance; its larger vessels, both arteries and veins, were filled with thrombi.

Microscopical examination shows the parenchyma and retiform spaces of the organ to be infiltrated and greatly distended with a massive extravasation of blood, with some hypertrophy of the retiform framework.

Cultures from the organ yield growths of the *staphylococcus pyogenes albus* and *bacillus coli communis*.

A case reported by J. Collins Warren bears a close resemblance to the one just described, minus the perisplenitis. Splenectomy was performed by F. B. Lund for rupture of an infarcted spleen. A man, aged twenty-six years, was taken to Boston City Hospital suffering with severe epigastric and left side pains, which were really aggravated by the lifting of a heavy basket. He had had attacks less severe for several months, was thin, anæmic, restless, groaning, and thirsty. He had an anxious expression, moist skin, and dry tongue; vomited a greenish fluid. There were some abdominal distention and epigastric tenderness. Free fluid and increase of dulness over splenic area; temperature, 101° F.; pulse, 124.

Diagnosis of peritonitis probably due to gastric ulcer was made and operation performed. About two quarts of blood were emptied out and a large ruptured infarcted spleen removed. The splenic vein was filled with a thrombus. After thorough washing of abdominal cavity and leaving in salt solution, the incision was closed. The man died on the fourth day. At the autopsy, a thrombosis of the portal vein, extending into the splenic, and a similar condition in a vein along the greater curvature of the stomach were found.

The most frequent cause of complete infarction, torsion of the pedicle, was not present in Lund's case nor in ours.

The rupture is easily explained by pressure against or other injury to a softened and distended spleen. In our case there was no distinct rupture of the capsule. It was more like an extravasation.

PRIMARY TYPHOIDAL PERFORATION OF THE GALL-BLADDER.¹

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THE term *primary* is used in this article with a view of eliminating all cases of typhoidal perforations of the gall-bladder secondary to perforation of the intestines; in other words, only those cases are considered in which it is positively demonstrable that the ulceration and perforation began within the gall-bladder.

On October 22, 1902, I saw a case of Dr. Griswold's, during his absence from Greenwich, with Drs. Piatti and Clark, of the same place, in which the diagnosis of a perforation of the intestine had been made, occurring in the sixth week of typhoid and during the first week of convalescence. The history of the case was a clear one of typhoid, and is as follows:

Female, aged forty-six years; married, mother of several children; passed through a typical prodrome, which was followed by a five weeks' course of unquestionable typhoid fever. The eruption, although scanty, was evident and unmistakable. Headaches, enlargement of the spleen, character of stools, abdominal distention, dry, coated, and fissured tongue, delirium, followed by manifestations of exhaustion, subsultus tendinum, and carphologia, presented a clinical picture that, even without the typical temperature, as shown by the chart, could be taken but for the one thing, typhoid fever. During the period of her third and fourth weeks a left-sided phlebitis developed. Two attacks of pain in the back, described as being between the shoulder-blades, were present in the third week, but at no time, according to the chart, were there any other symptoms present suspicious enough to call any attention or notice to the gall-bladder. Her temperature reached a normal plane at the close of the fifth week. On

¹ Read before the New York Surgical Society, February 11, 1903.

October 21, the day before I saw her and about the second day of her sixth week, convalescence was sufficiently advanced to allow her to sit up in bed. On the night of this day, at ten o'clock, she was seized with a severe pain in the abdomen, which required several hypodermics of one-fourth grain of morphine before any comfort was obtained. The site of this pain was not specialized as to its onset location when I saw her. She suffered considerable shock, and when seen by me, exactly twelve hours after the onset of pain, presented, in addition to those accompanying a protracted illness, the following symptoms: anxious countenance, pulse 120, respiration rapid, temperature 102° F., abdomen somewhat distended, exquisitely sensitive all over, but more marked on the right side.

Although rather later than usual for a perforation of the intestine, it was concluded best to explore the right iliac fossa. This was done by an incision through to right rectus. Upon incising the peritoneum there was a gush of bile-stained, cloudy fluid, with no odor and no food particles, through the opening in the abdominal wall. Our tentative diagnosis of perforation of the intestine was then changed to that of a probable perforation of the duodenum or gall-bladder; at the same time, all the small intestines were carefully gone over before extending the incision. Fully a pint of bile-stained fluid was sponged out during the process of inspection of the intestines and the enlarging of the incision. The gall-bladder and duodenum were easily exposed, and then it was seen that an opening, irregularly circular, fully one-quarter of an inch in diameter, was present in the lower portion and inner aspect of the gall-bladder near the cystic duct, through which clear bile was flowing. The gall-bladder on its outer aspect presented no other inflammatory manifestations, nor was it evident that it had been enlarged previous to the perforation. The mesentery and intestines were deeply stained with bile and were very friable, the peritoneum tearing upon the gentlest handling.

I decided to do a cholecystectomy. This was very easily accomplished, the hepatic attachment being separated, owing to the very friable condition, with the greatest ease. A double catgut ligature was passed about the cystic duct, the bladder excised, and the mucous membrane presenting in the stump brushed with pure carbolic acid; a gauze drain leading down to the stump, and also a gauze packing on the very freely bleeding hepatic

surface from which the gall-bladder had been removed, was employed. The peritoneal cavity was sponged out with salt solution and gauze pads. The abdominal wall was then closed, except at the point of exit of the drain and at its lower angle, where another gauze drain passed into the iliac fossa and pelvis. This latter drain was removed in three days. The drain and packing in the region of the stump were removed at this time, but another small drain was placed in this opening. A perfect recovery and complete union were recorded in three weeks. Upon closer investigation after the operation had been done, we were told that her onset of pain was situated at or about the usual surgical location for gall-stone colic, and that the general abdominal pain appeared at or about the end of the sixth hour.

Upon opening the gall-bladder, two small stones, so small as not to be considered factors in the cause of the ulceration, were found. The mucous membrane presented numerous small ulceration areas, and no opening was found to correspond to the opening seen on the peritoneal surface. There was a small ulceration area, about the size of the head of an ordinary pin, in the mucous membrane at a point almost directly through from that of the peritoneal opening, and, upon passing a probe into this opening, it was found to pass obliquely through the gall-bladder, making its exit through the peritoneal orifice, giving one the reversed picture of the funnel-shaped perforating ulcer usually seen.

Cultures taken from the contents of the peritoneal cavity and from the gall-bladder showed the colon and typhoidal bacilli.

I am indebted to Dr. W. W. Keen, of Philadelphia, for a number of references relative to this subject, rendering me thereby great assistance in the statistical part of this paper. In his book, "Surgical Complications and Sequels of Typhoid Fever," 1898, under the subject of "Gall-bladder Perforations," the statistics of thirty cases are recorded. I present with his assistance a record of three more, which, with my own, makes thirty-four cases, with four recoveries and thirty deaths, and append a brief record of each of these additional cases.

CASE I.—*Bolog. Gaz. Bot.*, No. 41, 1902. Gundehar.—Sex and age not given. Symptoms of perforating peritonitis on the twelfth day of

disease. Laparotomy performed; no evidences found. Cavity drained. Death in short time. Autopsy, gall-bladder found to be perforated.

CASE II.—*Lancet*, April 22, 1899, p. 1090. B. F. Anderson.—Male, twenty-seven years old. Diagnosis not made, as no symptoms directly warranted it; not operated upon. Autopsy showed perforation near the cystic duct. About third and fourth week of disease. No stones were found.

CASE III.—*Medical Chronicle*, January, 1901, p. 269. R. W. Marsden.—Male, seventeen years old. Pain in lower abdomen about the close of the second week. Operation performed, but, owing to collapse, the operation was discontinued after the peritoneal cavity was sponged clear of some greenish mucoid fluid, chiefly situated in the right flank. Death in nineteen hours after operation. Autopsy, numerous small mucous ulcers found, and a perforation at the fundus. No stones.

One of these cases, II, was a non-operative, and the others, I and III, were operated upon, but in neither of these was a complete operation done; all died.

Adding these three cases and my own to Dr. Keen's table, we then have the following record of twenty-five cases, in which the sex was recorded:

Under fifteen years, nine; recovered, one; died, eight.

Between fifteen and twenty-five years, six; recovered, none; died, six.

Over twenty-five years, ten; recovered, three; died, seven.

Of these, twelve were females and thirteen were males. The four cases that recovered were operated cases.

Time of onset: During the first week, one; second week, five; third week or later, twenty-one.

Of seven cases operated upon, four recovered and three died. Of twenty-seven cases not operated on, all died.

Stones were found in eight cases, while in seventeen no stones were found.

Of the seven cases operated upon, the perforation was near the cystic duct in three instances, in the fundus once, and the others not stated.

Diagnosis.—This can only be approximately made by obtaining a very thorough and careful anamnesis, particular stress being placed upon the original site of the pain, and remembering that pain in the gall-bladder region may indicate

perforating ulcer of the stomach at its duodenal end or of the duodenum itself, of the gall-bladder, and also the pain of acute pancreatitis, etc.

Treatment.—There can be no question as to what course to pursue in these cases, when we consider that of seven cases operated upon four recovered, while in the non-operated cases, twenty-seven in number, all died.

I prefer the incision through the rectus muscle rather than the one at its outer border or in the median line, as the exposure is without question the best with this incision, and the after possibility of hernia is reduced to a minimum.

The question with me as to what to do when a perforated gall-bladder is found is summed up in one word,—cholecystectomy. With our present knowledge of the necessity or not of a gall-bladder, particularly one that is diseased, the sacrifice of this viscus cannot give us one moment's unrest. Nevertheless, the condition of the patient and the surrounding viscera must weigh some in the matter of the disposition of the perforated gall-bladder; cholecystotomy and drain when cholecystectomy is not possible. The repair of the perforation in the gall-bladder by suture is unwarranted, first, owing to the marked friability of the tissues in these cases, and, secondly, the same objections arise as in the radical or ideal operation of cholecystotomy, *i.e.*, cholecystendese.

Recently, L. Baldassani and A. Gardini (*Münchener medicinische Wochenschrift*, 129, 1902), as a result of experimentation upon animals, advise the use of a musculo-peritoneal flap from the abdominal wall in such a manner as to bring the muscular layer on the inside of the bladder. I am quite satisfied that this method of repair will never be put to any but an experimental use, and that in lower animals only.

Prognosis.—As stated above, seven cases operated upon resulted in four recoveries and three deaths; two of the fatal cases reported by me as I and III, we can or should exclude, as incomplete operations were done. With a death-rate of one case out of five complete operations, we can certainly grant our patients and families a reasonable amount of assurance of the ultimate outcome of the operation.

RETROPERITONEAL HERNIA.

ACUTE STRANGULATION OF A KNUCKLE OF ILEUM IN A PERICÆCAL POUCH.

BY ALFRED BENNISON ATHERTON, M.D., LL.D.,

OF FREDERICTON, N. B., CANADA,

Surgeon to Victoria Hospital.

FOR a year, a man, aged thirty-three years, had complained of more or less pain and soreness in his right inguinal region running across the lower abdomen. Three months ago he consulted me about his trouble, and as I could find no evidence of disease on physical examination, and as he had never been laid up and had lost no flesh, I came to the conclusion that he was neurotic, and sent him away with words of encouragement, merely. Subsequently, he went to see a clergyman who does a good deal of prescribing for the sick, and he told him he had appendicitis, and should be operated on for it. He therefore visited me again on September 24, 1902, and said, if I did not operate, he would go elsewhere for an operation. I thereupon consented; although I told him I could not find anything to warrant the diagnosis of appendicitis. No alteration in his previous symptoms or condition had taken place since he previously consulted me, but he said his trouble prevented him from carrying on his usual farm-work satisfactorily.

September 25, 11 A.M. Operation.—The anæsthetic being given by Dr. Weaver, and assistance rendered by Dr. Mullin, an incision was made in line of outer right rectus and an apparently normal appendix three and one-half inches long removed. Incision then enlarged so as to admit my hand, with which I examined the pelvis and hypogastric regions. I found one or two appendices epiploicæ of the sigmoid adherent in the pelvis. These adhesions were separated. Nothing further observed which was a deviation from the normal condition. Wound closed, and the usual dressings applied.

For the first twenty-four hours after operation, the patient seemed much the same as after any laparotomy case. Towards the end of that time, however, vomiting began to occur every few

hours, and increased in frequency the second day, although the pain did not seem much worse than usual. Thinking that a movement of the bowels would set things right, I began the usual turpentine enemas, small, frequently repeated doses of calomel, and gave, finally, an enema of Epsom salts, but all without avail. These measures were used for twenty-four hours or more, lasting up to the evening of the 27th. Meantime the vomiting became more and more frequent, and the pulse ran up to 112 or 115. The temperature had never risen above 99° F. Considerable abdominal distention had also appeared. During the third night the vomitus became distinctly intestinal in appearance and odor, and at morning visit on the 28th I found the temperature 100° F., and the pulse 136 and weak.

I now removed a few sutures, and about three drachms of dark blood-stained serum and a few bubbles of gas escaped. Then, after administering a little ether, I introduced a finger or two, and feeling a part of the bowel in the right iliac fossa somewhat harder than the rest, I pulled upon it, and out popped a knuckle of gut about two and one-half inches in length, quite black and with an opening near its middle one-third of an inch in diameter. The line of demarcation between the living and dead bowel was clearly defined, and the adjoining sides of gangrenous knuckle were united by easily separated adhesions.

I now resected eight or nine inches of the bowel, including the dead portion, and united the ends by two rows of silk sutures, the inner one mattress with the ends tied internally, and the outer a continuous Lembert suture. Iodoform gauze used for drain, and the usual dressings applied.

In spite of strychnine and brandy hypodermically, he gradually sank, and died the same evening at seven o'clock.

A hasty and slight post-mortem examination revealed a somewhat distended cæcum with the lower two feet of ileum collapsed. At this point the resected bowel was sutured. Above this the ileum was distended. No sign of old adhesions anywhere to account for the strangulation, but in the locality from which I pulled the gangrenous knuckle of bowel I found a pouch about an inch deep and having an opening of the same diameter. It was situated just to the outer side of the lower end of the cæcum and partly behind it. The stump of the amputated appendix was found half an inch to the inner and lower side of the pouch.

Remarks.—The rarity of strangulation of the bowel in one of these intraperitoneal pouches seems to me of itself to warrant the report of this case. Then, again, its occurrence after an ordinary abdominal section, and apparently as a result of it, makes it still more deserving of record.

The painful and uncomfortable feelings which led the patient to seek advice were probably due to the occasional entanglement of a loop of bowel in the pericæcal pouch. Sir F. Treves says that in some of these cases "long-continued intestinal uneasiness" has preceded the strangulation. I attribute the onset of the acute symptoms after the first operation to the occurrence of some distention of the bowels as a result of their having been handled considerably, and the consequent crowding of the loop of ileum into the pouch, where it became more distended, perhaps, through its incarceration, and was thus more firmly fixed there; while the further distention of the small intestine above the point of strangulation as well as the somewhat distended condition of the cæcum (which was found at the post-mortem examination) doubtless aided in preventing the escape of the entrapped knuckle.

It seems somewhat remarkable that complete gangrene and perforation should have arisen in about forty-eight hours after the symptoms of strangulation fairly set in, where the opening to the pouch was so large, and where the bowel was liberated with so little effort as I used to dislodge it. But no old adhesions or bands were found in the neighborhood, or anything else to account for the strangulation.

Finally, the history of this unfortunate case teaches us that we must bear in mind the possibility of at any time having to deal with such a rare condition.

A SUCTION APPARATUS FOR CONTINUOUS DRAINAGE.

WITH REPORT OF CASE OF INTRAPERITONEAL RUPTURE OF BLADDER.

BY KARL CONNELL, M.D.,

OF NEW YORK CITY.

OF the various modes of suction at our command, probably the simplest, certainly the cheapest and most convenient, exhaust is the hydraulic pump.

Sprengel applied the fall of short columns of mercury through tubing to the laboratory exhaust which bears his name. As each column falls it forms a liquid piston, which propels the air ahead and tends to exert a suction behind proportionate to the weight of the column. In applying this principle to surgery, it is found that water presents a more convenient liquid of sufficient weight even in a short fall. It must be borne in mind that liquids have their limit of cohesion. If a definite column of water is run through a tube of large diameter, the velocity must be considerable for it to maintain its integrity as a piston; otherwise the adhesion to the tubing will overcome the cohesion of the water, which will then run down the side of the tubing instead of moving in a solid piston. Experimentation will demonstrate that perfect cohesion of water is limited to the three-sixteenths inch tubing. For instance, in one-fourth inch bore the bottom of our liquid piston is slowly but continually breaking away and trickling down the side of the tube. This waste increases with the diameter, until in one-half inch tubing we lose roughly three inches of our liquid column each second. A tube three-sixteenths of an inch then is to be selected as the bore combining maximum efficiency and economy.

To effect reliable automatic intermittence in the water supply to the tube by some device which will permit the "water

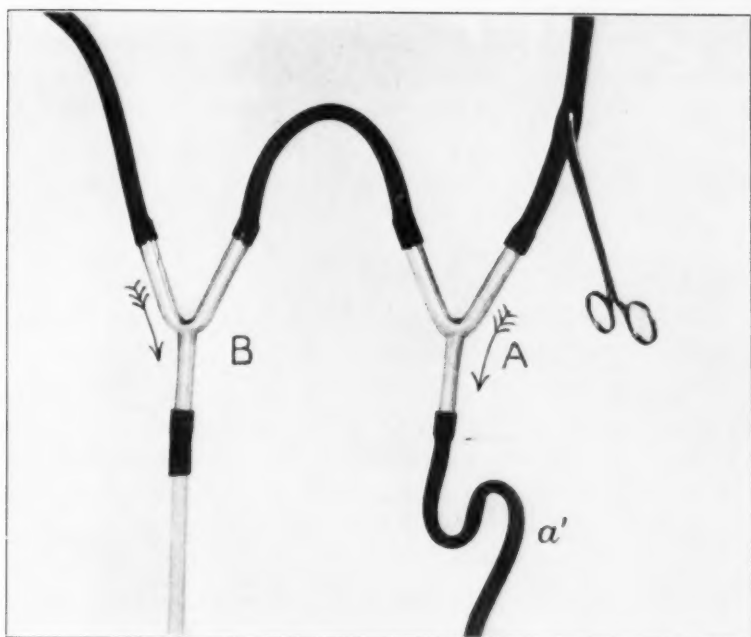
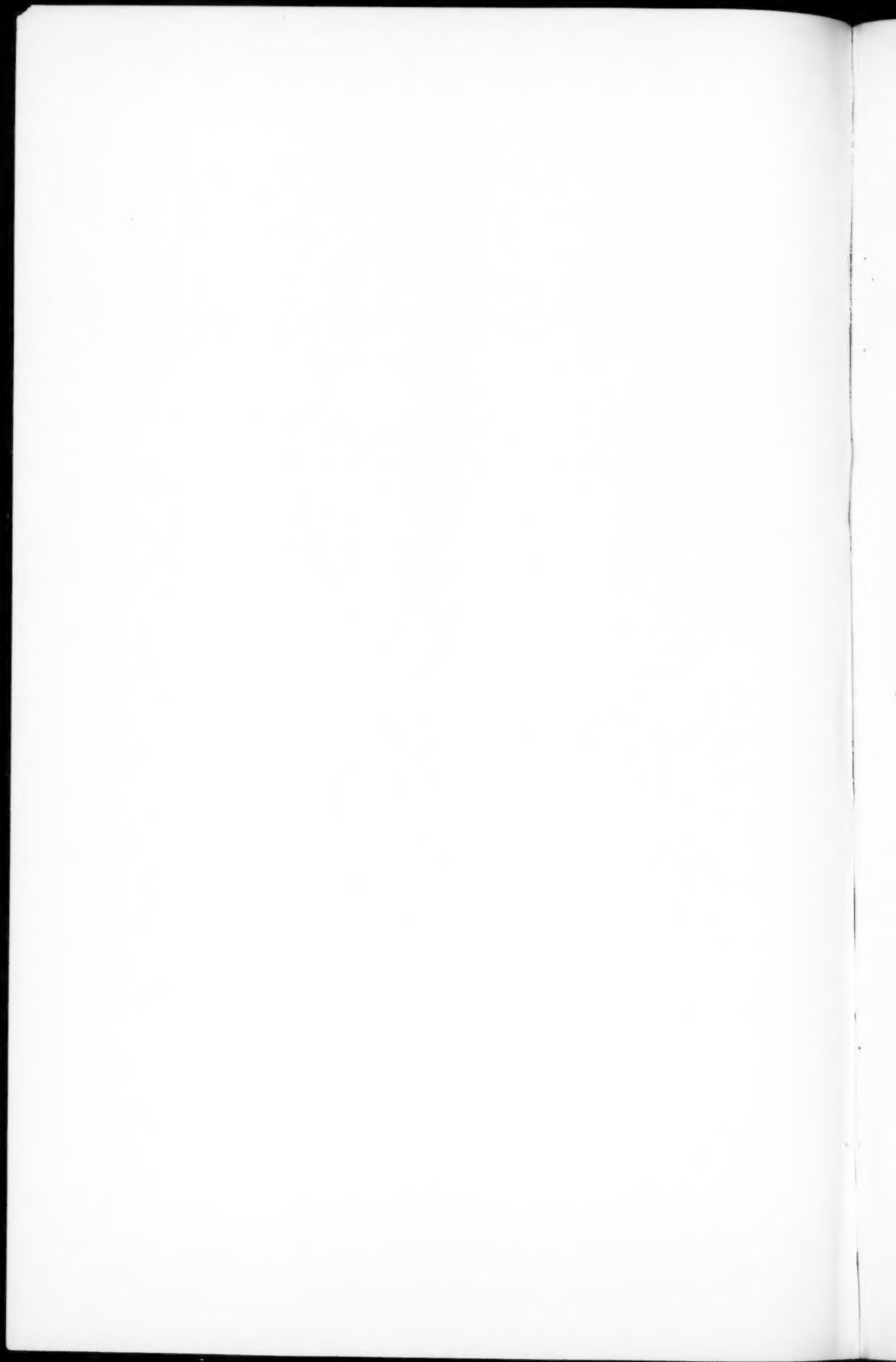


FIG. 1.—Connell suction apparatus for continuous drainage.



piston" to form is readily secured by placing a U bend or a loop (Fig. 1, *a'*) in the tubing, in which the water will collect until it has filled the U to overflowing, when the mass will siphon over and descend in a short solid column. There results a suction apparatus, the power of which is limited only by the vertical fall of the liquid after leaving the U and of a capacity utilizing four ounces of water per minute in a fifteen inch fall, or two gallons per hour, to aspirate ten ounces per minute; or using two quarts of water per hour to aspirate one and one-half ounces per minute of air or urine or bile or thin pus, which is well beyond any surgical requirement. This tube is now connected by a glass Y or some modification thereof; by one limb to the reservoir from which the water is slowly fed; by the other to the cavity to be aspirated. This completes a cheap, easily constructed, effective pump (Fig. 1, A).

A desirable refinement can be introduced in the form of a trap which will short circuit the aspirated material (Fig. 1, B). This is attained by throwing a glass Y with a long lower limb into circuit between the pump and the viscus being aspirated. The lower end of the Y must be submerged. A column of liquid will be sucked up into this stem, which will furnish an accurate gauge of the amount of suction. This trap will short circuit all aspirated material, permitting it to be measured and preventing fouling the pump and power water. In case of emergency it will also short circuit any reflux from a deranged pump which might otherwise back up onto the viscus being aspirated. This is the form of continuous aspirating apparatus which has been used at the New York Hospital for the past fifteen months as routine, where suprapubic drainage of the bladder is established. It has also been applied to aspirating the ureters and empyema cavities. By the continuous evacuation of bile from the gall-bladder following cholecystotomy with excessive discharge, it keeps the dressings clean and lessens the possibilities of intraperitoneal leakage and accumulation.

As illustrating further elaborations of intraperitoneal aspiration, of useful but less general application, Fig. 2 demon-

strates the original and more complicated form of the foregoing, which was devised by the writer when House Surgeon of New York Hospital under Dr. Francis H. Markoe, Attending Surgeon, in December, 1901, to meet the requirements of a case of intraperitoneal rupture of the bladder.

A. Bunsen pump constructed by inserting a fine glass tip into the side of rubber tube and constricting orifice at which water jet is thrown. This pump is of equal strength and greater capacity than Fig. 1, A, but is nicer of adjustment and liable to clog, hence less desirable.

B. Trap, gauge, and safety-valve.

It was considered desirable to establish continuous irrigation of the bladder in addition to continuous suction drainage in order to preserve intravesicular cleanliness and asepsis. This irrigation was secured as follows:

(2) C. Double current suprapubic tube, home-made, by dragging a small catheter through the side and lumen of a larger tube from the intravesicular end of which the smaller protrudes.

To preclude positive pressure from excess of irrigation, this was sucked up by the negative pressure created in the bladder by pump, A, from a level four inches below that of the patient's bladder; reservoir, D, kept warm by electric light, E, and of constant level by automatic siphon bottle, F.

Had not the integrity of the bladder been disturbed, and even slight positive pressure a menace to the long suture line of the intraperitoneal tear, these last features could have been eliminated, and the weak antiseptic solution run in under positive pressure. This latter would be the choice in cases such as tuberculosis of the bladder and chronic cystitis, where suprapubic drainage with continuous irrigation is desired.

The case of intraperitoneal rupture of bladder is one of unusual interest, and with the kind permission of Dr. Markoe it is appended, adding another to the twenty-two cases of such lesions reported in the past ten years, collected by Alexander (*ANNALS OF SURGERY*, August, 1901) and Jones (*ANNALS OF SURGERY*, February, 1903) in their recent memoirs in the *ANNALS OF SURGERY*.

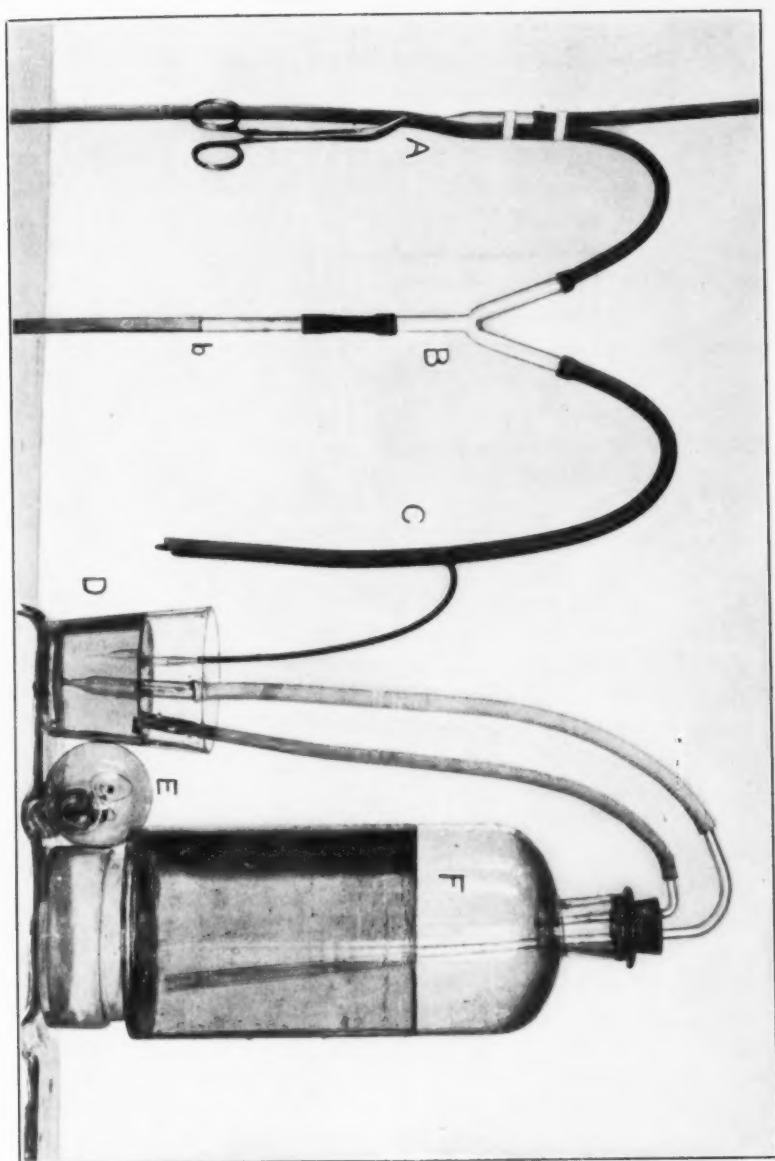


FIG. 2.—Connell suction apparatus for continuous drainage.



Joseph B., a German waiter, thirty-eight years of age, was admitted to the New York Hospital in December, 1901, with the history that, thirty-six hours before admission, while reeling home after drinking through the evening twenty to thirty glasses of beer and considerable whiskey, he had stumbled and fallen, his hands being in his side pockets, flat on his abdomen upon the smooth stone walk. He sustained contusions of the face, but otherwise seemed uninjured. Got up unassisted, and without further known trauma went to bed. Awoke fourteen hours later with headache; hæmatemesis, probably of swallowed blood; severe general pain in the abdomen, more in lower portion; vesical tenesmus, and inability to pass any but a little bloody urine. Emesis not repeated. Pain and tenesmus continued all day, followed by a restless night. Towards morning, twenty-four hours after injury, patient began to have slight passive incontinence of bloody urine, and had several slight shaking chills. Walked to the dispensary in the afternoon, where about eight ounces of very bloody urine was withdrawn by catheter; rupture suspected, and patient sent to the ward.

He was a well-developed man, mind active and rational, and alleged that he had only slight abdominal discomfort. Contusions of the face. Slight general cyanosis. Breathing mainly thoracic. Underwear stained with bloody urine. Abdomen moderately corpulent, no evidence of trauma, slightly rigid, moderately tender over lower portion, slight indefinite dulness in flanks. No fluid wave. Rectal temperature, 97.4° F.; pulse, 120, soft; respiration, 24. Leucocytes, 18,000.

Operation, Dr. Markoe, thirty-eight hours after injury. On preliminary catheterization, fifty ounces of bloody urine obtained. Through a suprapubic cystotomy a large rent could be felt in the fundus of the bladder. Incision enlarged upward and peritoneum opened. About a pint of urine and blood-clots turned out of the pelvis. Rent now evident in the bladder, which, with this viscus empty, extended in almost the median line from a point an inch behind the anterior reflection of the peritoneum to a point past the peritoneal reflection onto the rectum. Secondary to this and not coinciding in direction was a stellate tear in the overlying peritoneum, one limb of which extended forward, another backward and to the left a distance of four inches into the mesosigmoid, and a third extending backward and to the right. Peri-

toneum slightly injected. No peritonitis. The bladder was sutured by a single row of interrupted fine chromicized gut sutures, including the muscular coat. The peritoneal tear was sutured over this by continuous gut suture. The abdomen was cleansed with salt irrigation, dried, and closed, leaving a small wick of gauze into the vesicorectal pouch. A suprapubic drainage tube was inserted into the bladder and the superficial layers of the wound were partly closed.

Intraperitoneal drain removed second day, pelvis clean and fairly dry. Peritoneum closed by a stitch. Temperature ranged about 101° F., except for a transient rise on the second day, until the fourth day, when it rose to 104°, and leucocytes from 8000 to 19,000. Ran a septic course for several days together with signs of slight peritoneal irritation. Interpreted as a sapræmia from a blood-clot. Symptoms abated and further course was uneventful. Irrigation discontinued after a week. Smaller tubes substituted and aspiration discontinued on sixteenth day, after which fistula leaked for forty-eight hours. Wound healed completely by end of fifth week. Health has since remained excellent and urinary condition good, save that four months after discharge of patient, following the ingestion of two quarts of milk punch and several glasses of beer, he was afflicted with hæmaturia for several days.

PRIMARY CARCINOMA OF THE APPENDIX.¹

BY ALEXIS V. MOSCHCOWITZ, M.D.,

OF NEW YORK,

Adjunct Attending Surgeon to the Mount Sinai Hospital. (From the First Surgical Division, Mount Sinai Hospital; Arpad G. Gerster, M.D., Attending Surgeon.)

REPORTS of primary carcinoma of the appendix in literature date back practically only to 1896. The few isolated cases recorded prior to that year are the results only of the systematic tabulation of extensive autopsy material (Nothnagel, Maydl, Leichtenstern). During the past six years, however, the casuistic reports have multiplied to such an extent that this disease must cease to be merely a medical curiosity, and, indeed, it was looked upon as such until the present; and yet, even when one includes all of the reported cases, some twenty in all, primary carcinoma of the appendix is still of sufficient rarity to merit the publication of all cases.

As yet the clinical picture of this disease is very meagre, and largely, if not wholly, obscured by the accompanying, more or less acute, inflammatory process. In view of the fact just stated, and also because, in the course of the past eighteen months, we had occasion to operate upon three cases of undoubted primary carcinoma of the appendix, it has occurred to the writer that it might be of interest to critically review all of the published cases in order to determine whether a definite clinical picture might be evolved. It cannot be said that my efforts in this direction have been crowned with much success; but, at all events, so many interesting and novel data have resulted from this work that I have deemed it of sufficient value and interest to publish them.

For the sake of completeness, I shall begin with the histories of our cases. As will be seen, the history of Case I and Case III are of unusual length; while that portion of the his-

¹ Read at a meeting of the New York Academy of Medicine, March 5, 1903.

tory which is directly related to the diseased appendix might be condensed into a very short space, it was deemed advisable to detail these two histories in full for the following reasons. In Case I, because of the preceding and subsequent gastric symptoms, which gave good cause, at least, for the presumption of a malignant metastasis in the stomach; in Case III, because of the accompanying pyrexia and serious condition of the patient, which, however, as will be seen, were due to causes entirely extrinsic to the appendix.

Case I and Case II were operated upon by myself, Case III by Dr. Gerster.

CASE I.—Isaac S., thirty-seven years old, married, and a saloon-keeper by occupation, was admitted to Mount Sinai Hospital on July 12, 1901. His family history is negative.

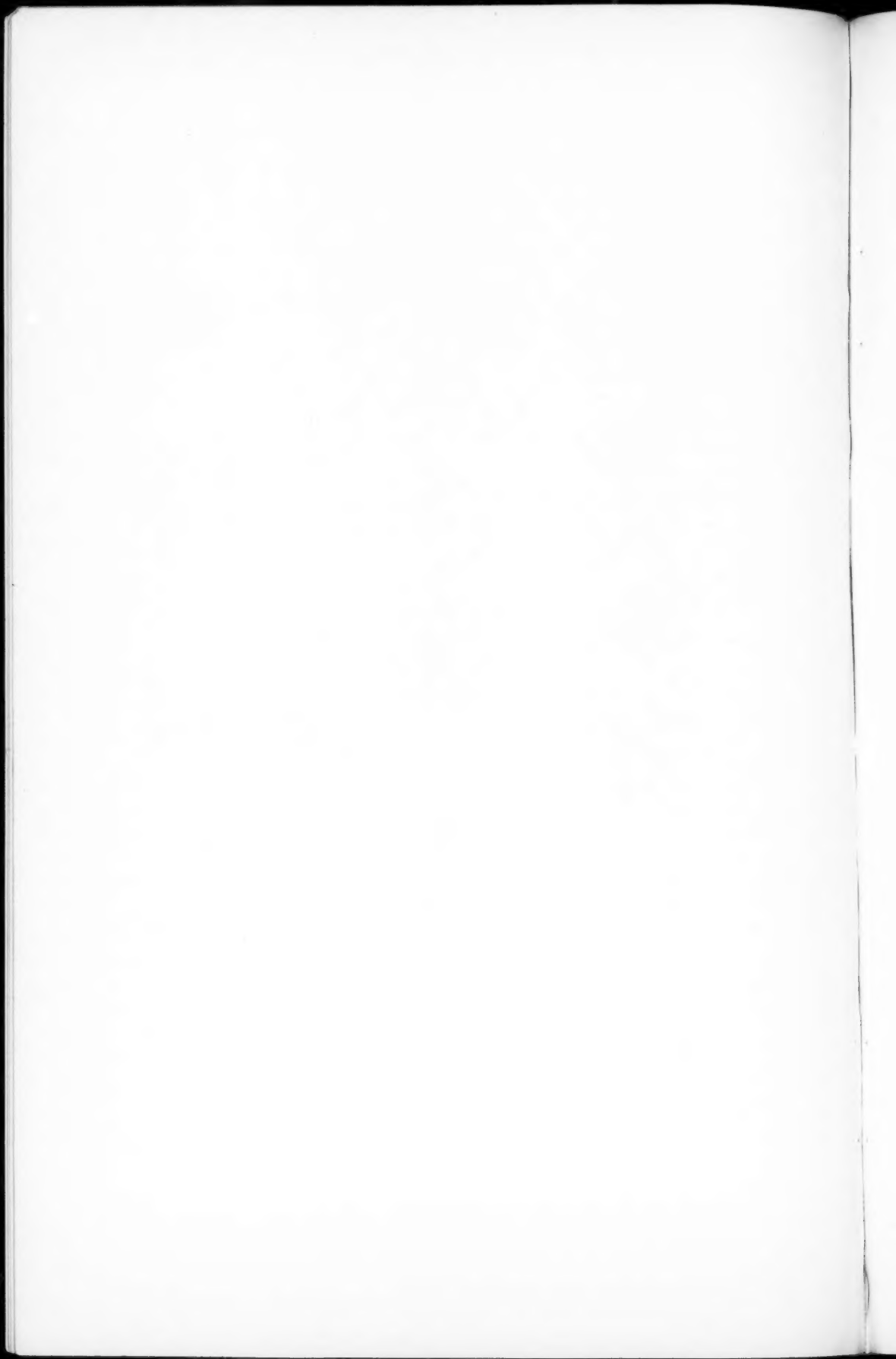
Past History.—Patient was well up to three years ago, at which time he began to vomit; at the onset he vomited as often as he took any food; but he never vomited any blood, the vomitus consisting only of the ingested food. At the same time he also complained of pain in the epigastrium, which remained localized, and did not radiate. After vomiting in this way for a year, he was admitted to the medical side of Mount Sinai Hospital, and was treated for fourteen weeks; he was discharged with the diagnosis, "alcoholic gastritis." After his discharge he visited various specialists abroad, but the vomiting persisted unabated up to the present, and, as was to be expected, the patient in consequence became greatly emaciated.

Present History.—On July 11, or one day prior to his admission to the hospital, patient was suddenly stricken with severe cramp-like pains all over the abdomen; very soon these pains became localized in the right iliac fossa; in addition, there was at the onset, also, a very severe chill, followed by high fever. The vomiting continued with increased force; his bowels were constipated. Patient also states that during the past few months he has frequently had severe attacks of abdominal pain, on an average once a month, to which, however, he attached no special importance, attributing them to his old malady.

Physical Examination.—General condition is good; patient is fairly well nourished, in spite of the past history; the face is



FIGS. 1, 2, 3.—Primary carcinoma of the appendix vermiformis.



flushed. With the exception of the abdomen, the physical examination was practically negative. The abdominal walls were held rigid, especially on the right side. In the right iliac fossa, and well to the outer border of the rectus, and about on a level with the iliac crest, there was to be palpated a small but very tender mass; percussion over the mass gave a dull tympanitic note. Nothing to be felt by rectal examination. Temperature, 101° F.; pulse, 72; respirations, 24.

The diagnosis of appendicitis, with general peritonitis, was made, and immediate operation proceeded with. Kammerer incision; on opening the peritoneum, free pus welled up into the wound from the general peritoneal cavity. The palpating finger discovered a mass low down over the outer half of Poupart's ligament. In this mass lay the appendix, twisted upon itself, its tip pointing towards the anterior superior spine, and buried in adhesions; it was freed and extirpated. Suture of the abdominal incision; drainage through the lower angle.

Autopsy of the appendix directly after its extirpation. The appendix is three inches long, much congested and swollen. At its tip, and embedded in its walls, there is a small, yellowish mass, about the size of a bean, which was firm to the touch, and apparently sharply encapsulated. Just below this mass there was an area of gangrenous mucous membrane, about half an inch wide, involving the entire circumference of the appendix. At about the middle of the appendix there was to be seen another patch of gangrenous mucous membrane about half an inch square (Fig. 1).

The wound healed kindly, being complicated only by the persistent vomiting and epigastric pain complained of for three years prior to the operation. It was but natural for us to think of a malignant growth of the stomach secondary to the carcinoma of the appendix; the stomach contents, however, showed an abundance of free HCl, and no mass was to be palpated, so that we felt justified in excluding this diagnosis. At all events, it was clear that there was evidently some pyloric obstruction present, and with this in view, Dr. Gerster operated on him August 5. A benign stenosis of moderate degree was found, for the relief of which a gastro-enterostomy was done. He left the hospital in good condition (the Murphy button not having passed, however), and remained well for two months thereafter, without vomiting, and gaining about twenty-five pounds in weight.

He returned December 4, 1901, with a recurrence of the old symptoms; these were ascribed to the presence of the retained button; the button was therefore removed by gastrotomy. This operation was exceedingly difficult, the button having been found tightly wedged in at the original site. To insure a patency of the anastomosis, a variety of the Heinecke-Mikulicz operation was performed on the gastro-enteric opening. Again he was discharged well, and remained so until his readmission on May 28, 1902, with a history of a recurrence of the vomiting. On examination there was found an epigastric and lateral ventral hernia. It was noted that, by pressure on the epigastric hernia, his vomiting was relieved; this led to the conclusion that the trouble was due to adhesions, for which I performed a radical operation for the cure of the epigastric hernia, sewing the different layers of the abdominal wall by layer suture. He was again discharged cured, but returned again December 22, 1902, with the old symptoms. I again operated for the cure of the lateral ventral hernia. At this operation, I examined carefully the site of the appendix and the neighboring abdominal cavity as far as allowable, and found absolutely no recurrence of the carcinoma. He was discharged January 14, 1903, with a cessation of his vomiting.

I have gone at some length into the history of this case; as already stated, this was done because there always exists the possibility of recurrence and metastases after the extirpation of a carcinoma, and I wished to disprove, as far as it lay in my power, its existence in this case.

CASE II.—Rosa P., twenty years of age, a tailoress by occupation, was admitted to the hospital on May 28, 1902. Her family and past history is negative in all respects. Ten days ago the patient experienced for the first time pain in the right iliac fossa; this pain has persisted with varying intensity up to the time of admission; she has had two chills, but apparently there was no fever; she has not vomited, and with the aid of cathartics her bowels have moved daily.

The physical examination was negative, with the exception of the abdomen; the abdomen was lax and tympanitic, but exquisitely tender to deep pressure in the right iliac fossa; no tumor was to be palpated. Temperature, 100.2° F.; pulse, 84.

The diagnosis of appendicitis was made, and patient was operated on May 30 through a McBurney incision. After open-

ing the peritoneum, and after severing some fine adhesions, the appendix was delivered into the wound and extirpated. Layer suture.

Autopsy of the appendix directly after its extirpation. The appendix was four inches long; its serosa is congested, and particularly at its distal extremity covered with a fresh, yellowish-red, transparent, gelatinous exudate, in which were to be seen a number of fine granules, not unlike those seen in actinomycosis. One inch from the tip of the appendix there is to be felt a hard nodule, approximately half an inch long and one-quarter of an inch in diameter, its long axis lying in the long axis of the appendix. On laying the appendix open, it is seen that in the proximal two and one-half inches the mucous membrane is hypertrophied, and occasional punctate hæmorrhages are to be seen in this area; the next half inch is occupied by a firm, yellowish tumor corresponding to the nodule felt from without; the distal portion again shows hypertrophy of the mucous membrane, but no hæmorrhages (Fig. 2).

The patient made a perfectly normal convalescence, and was discharged on June 21, 1902.

Patient presents herself from time to time for re-examination; as yet no recurrence or metastases are noted.

CASE III.—Dora G., twenty-four years of age, a housewife by occupation, was admitted to the hospital October 26, 1902. Her family history is negative. She has been married since May, and is now about five months pregnant; foetal movements have been felt for two weeks; prior to her pregnancy menstruation was normal.

The present history is of five days' duration; began with pain in the hypogastrium, and very frequent and painful micturition; this pain has continued without any remission. Has had a chill on the day previous to admission, and some fever; bowels have moved when aided by enemata. The foetal movements have either ceased entirely, or at all events have grown very faint.

Physical Examination.—General condition fair, well nourished; cheeks flushed; facies anxious; tongue dry and coated; throat reddened, but in other respects negative. No petechiæ; no jaundice, and no œdema to be seen anywhere.

Thoracic organs normal, excepting that the heart's action is

He returned December 4, 1901, with a recurrence of the old symptoms; these were ascribed to the presence of the retained button; the button was therefore removed by gastrotomy. This operation was exceedingly difficult, the button having been found tightly wedged in at the original site. To insure a patency of the anastomosis, a variety of the Heinecke-Mikulicz operation was performed on the gastro-enteric opening. Again he was discharged well, and remained so until his readmission on May 28, 1902, with a history of a recurrence of the vomiting. On examination there was found an epigastric and lateral ventral hernia. It was noted that, by pressure on the epigastric hernia, his vomiting was relieved; this led to the conclusion that the trouble was due to adhesions, for which I performed a radical operation for the cure of the epigastric hernia, sewing the different layers of the abdominal wall by layer suture. He was again discharged cured, but returned again December 22, 1902, with the old symptoms. I again operated for the cure of the lateral ventral hernia. At this operation, I examined carefully the site of the appendix and the neighboring abdominal cavity as far as allowable, and found absolutely no recurrence of the carcinoma. He was discharged January 14, 1903, with a cessation of his vomiting.

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The present history is of five days' duration; began with pain in the hypogastrium, and very frequent and painful micturition; this pain has continued without any remission. Has had a chill on the day previous to admission, and some fever; bowels have moved when aided by enemata. The foetal movements have either ceased entirely, or at all events have grown very faint.

Physical Examination.—General condition fair, well nourished; cheeks flushed; facies anxious; tongue dry and coated; throat reddened, but in other respects negative. No petechiæ; no jaundice, and no œdema to be seen anywhere.

Thoracic organs normal, excepting that the heart's action is

more rapid and overforcible; in addition, there was to be heard a rough systolic murmur over the pulmonic area, transmitted downward for a short distance.

The abdomen is considerably distended, but there is no sign of any effusion; there is some tenderness over both lumbar regions, particularly on the right side.

The liver percusses as if it were slightly enlarged; the spleen is not enlarged.

The uterus is palpable two fingers'-breadth below the umbilicus; the foetal movements are felt, but the heart sounds are not distinct. The os is soft, slightly patulous; both fornices are free; no vaginal discharge.

Rectal examination is negative.

The urine was cloudy, and deposited a sediment of half an inch on standing; it was acid, 1010, contained some albumen, no sugar; microscopically, many pus-cells, no casts.

On admission the temperature was 100.6° F.; pulse, 106; respiration, 28.

On October 27 the temperature rose to 104.8° F., with a corresponding increase in the pulse-rate. Examination showed the presence of a leucocytosis of 17,500; the absence of malarial organisms; Widal was also negative.

Between October 28 and November 3 there was daily a marked rise in the temperature up to 105° F. In the mean time the general condition has rapidly deteriorated; patient lost a great deal in weight; the face looked pinched; the tongue was dry and coated. In other words, a fatal termination was in outlook unless something was done. Practically, the only physical sign of any value which was present was the pain in the right side of the abdomen. An exploratory laparotomy was decided upon, and carried out on November 3 by Dr. A. G. Gerster.

Inspection revealed nothing pathological, excepting, perhaps, the tip of the appendix, which was adherent to the iliac fossa, and covered with a small amount of exudate; this was therefore extirpated. The uterus and uterine appendages were normal, and corresponded to the fifth month of pregnancy. The gall-bladder and bile passages, as well as the right kidney and pylorus, were inspected, and found to be normal.

Autopsy of the appendix directly after extirpation. The appendix was three inches long, and about the thickness of a lead-

pencil. At its tip there was a thickening which could be distinctly felt; several engorged vessels were seen crossing this bulbous portion in a longitudinal direction. On section it was found that the lumen was obliterated in the distal portion; in the proximal portion the mucosa was thickened. (In this case there was missing the apparent encapsulation of the tumor noted in the other cases.) (Fig. 3.)

The condition of the patient after the operation was hardly different from what it was before. She continued to run septic temperatures, had a rapid pulse and a high leucocytosis. The wound healed uneventfully *per primam*. In the mean time her general condition was becoming worse and worse; nothing further could be determined as regards the cause of the seriousness of her condition, except the possibility of an autointoxication as the result of her pregnancy. An artificial labor was decided upon, and this was performed by Dr. J. Brettauer, Attending Gynæcologist, on November 10; a healthy foetus was extracted, nor was anything found about the placenta or membranes which would account for her septic condition. At all events, she improved almost immediately after the artificial labor; the temperature and pulse soon dropped to normal; the general condition improved very rapidly, and patient was discharged, perfectly well, on December 4.

In this history I have also gone at some length, although in its careful observation the firm conviction was gained that the carcinoma of the appendix was only an accidental and incidental finding. It cannot, however, be denied that it was the presence of the diseased appendix, which early in the disease gave rise to those abdominal symptoms, which gave more than ample justification for the exploratory laparotomy, and for the extirpation of the appendix. Already during this operation it was recognized that the appendix, while justifying an extirpation, did not give rise to those severe toxic phenomena under which the patient labored, and this was confirmed by the subsequent course of her disease.

A fairly careful search of the literature revealed the presence of eighteen additional authentic cases of primary carcinoma of the appendix, viz., Jessup,¹ one case; A. O. J. Kelly,²

two cases; Hurdon,³ one case; Letulle and Weinberg,^{4, 5} four cases; Rolleston,⁶ one case; Mosse and Daunic,⁷ one case; Wright,⁸ one case; Goffe,⁹ one case; Whipham,¹⁰ one case; Stimson,¹¹ one case; Harte and Willson,¹² two cases; McBurney,¹³ one case; Lartigau,¹⁴ one case.* The three cases of Leichtenstern, Nothnagel, and Maydl are not included in this list. This does not by any means pretend to be a complete list of all the cases on record, but it is all that I could find after devoting considerable time to this search. No doubt there are other cases recorded; and there is reason to believe, as is usual in matters of this nature, that there are in existence a number of cases which have never been placed on record. At this point it may also be stated that, in looking over the recorded cases, the first point which strikes one is that the majority of these cases are of recent date. If we exclude the cases of Leichtenstern, Nothnagel, and Maydl, which happen to be merely accidental autopsy findings in a large statistical material, practically all the cases have been reported within the past six years. I am sure it is hardly necessary to remark that it would be manifestly wrong to base upon this fact the deduction that primary carcinoma of the appendix is growing more frequent; rather, that this pathological finding is being recognized more and more, now that the attention of pathologists and surgeons has been directed to it. Even now appen-

* Some time after this article was finished, I read de Ruyter's²⁰ article, "Ueber Carcinomentwicklung," in the *Archiv für klinische Chirurgie*, vol. lxxix, page 281. In this article a short *résumé* is given of the following case, to prove that chronic irritations play a rôle in the development of carcinoma.

The patient was operated upon six years ago for a recurrent appendicitis. The appendix contained a faecal concretion, and was developed with difficulty, but finally was resected and extirpated; numerous pericæcal abscesses were also opened and drained. Thereafter patient had a number of attacks of localized peritonitis, but finally recovered completely. He died six years later from pyæmia, which originated in a phlegmon of the leg.

At the autopsy there was found a small, apparently cystic tumor in the stump of the appendix, which on microscopical examination proved to be a colloid carcinoma.

dices removed, particularly in those hospitals in which a large number of cases are operated, are not examined microscopically as a routine procedure, or at best are examined only macroscopically, unless the gross pathological examination is such as to promise some unusual finding. That the gross appearance alone is not sufficient is well proven by the report of three cases (two cases of Harte and Willson, and case "b" of A. O. J. Kelly) in which absolutely nothing of a suspicious nature was to be seen macroscopically, and the true nature of the cases was recognized only after the more careful microscopical examination.

The number of cases is still by far too small to enable us to say anything regarding the frequency of primary carcinoma of the appendix. However, in view of the increasing reports of cases in recent years, I believe that we are fully justified in saying that primary carcinoma of the appendix is far more frequent than we are led to believe from the statistics of Nothnagel and Maydl, who, in over 40,000 autopsies at the "Allgemeine Krankenhaus of Vienna," found only two cases of primary carcinoma of the appendix.

On the other hand, it would be of more than passing interest to know the relative frequency as compared with other diseases of the appendix. To solve this question, we can make but very little use of the few published cases, as they do not discuss this point at all. Nor can we learn any more by consulting the larger special treatises on appendicitis, in which this point appears to be discussed only in a very superficial manner.

Sonnenburg,¹⁵ who up to 1900 had operated upon about 750 cases of appendicitis, has evidently seen no case of primary carcinoma; in speaking of this subject, he merely refers to some cases in the literature.

Deaver¹⁶ says that in 706 cases of appendicitis operated during 1897, 1898, and 1899 there were found three cases of carcinoma of the appendix. (One of these is evidently a secondary tumor.)

Of late years, at Mount Sinai Hospital, between 200 and 300 cases of appendicitis are operated upon annually, and the three cases above described are the only ones which have been discovered up to the present time. It is to be regretted, however, that even these figures will allow of no definite deductions; the principal cause for this lies in our limited laboratory facilities, which do not permit the microscopical examination of the large number of appendices removed; only the extraordinary or suspicious cases are examined, and, as we have seen, this is by no means sufficiently accurate to permit an absolute opinion.

Primary carcinoma of the appendix may be studied from two different aspects: First, the clinical, and, second, the pathological.

I. THE CLINICAL ASPECT.

At the outset, it is necessary to state that, in the consideration of this side of the question, we are compelled to exclude all those cases which are the result of an accidental autopsy finding. If this is done, it will be seen that, for the purpose of making a clinical picture, there is available only the relatively small number of fourteen cases, viz., Jessup, one case; Kelly, two cases; Hurdon, one case; Rolleston, one case; Goffe, one case; Stimson, one case; Harte and Willson, two cases; Letulle and Weinberg, one case; McBurney, one case, and Moschcowitz, three cases.

Thus, while fourteen cases are hardly sufficient on which to build a definite clinical picture, even this number will be materially reduced by the fact that a number of these cases have been reported merely as medical curiosities, and therefore with incomplete clinical reports.

In attempting to make a clinical picture for the malady in question, I have been guided principally by the more common symptoms of appendicitis, viz., (1) Pain; (2) Tenderness; (3) The presence or absence of a mass; (4) Rigidity; (5) The temperature; (6) The pulse; (7) The presence or absence of adhesions; (8) The history of previous attacks; and, in addition, I shall discuss certain other anamnestic data which are presumably characteristic for carcinoma in other parts of

the body, viz., (9) The age of the patient; (10) The sex of the patient, and (11) The question of heredity.

(1) *Pain*.—Pain in the region of the appendix is noted in eleven of the fourteen cases, or in 78.5 per cent., viz., in Kelly's case "b," in Hurdon's case, in Goffe's case, in Stimson's case, in both Harte and Willson's cases, in Letulle and Weinberg's case "a," in McBurney's case, and in Moschcowitz's three cases. There was nothing characteristic about the pain in any one of the cases; in Hurdon's case the pain was not even suspected to be due to the appendix, but was ascribed to a concomitant floating kidney.

(2) *Tenderness*.—Tenderness in the region of the appendix was noted in ten of the fourteen cases, or in 71.4 per cent., viz., in Kelly's case "b," in Goffe's case, in Stimson's case, in both Harte and Willson's cases, in Letulle and Weinberg's case "a," in McBurney's case, and in Moschcowitz's three cases. Many of the reported cases are silent on this point; but pain and tenderness go so frequently hand in hand in all forms of appendicitis that it is safe to assume that tenderness was present in all of those cases in which pain was a symptom.

(3) *The Presence or Absence of a Mass*.—I do not refer at this point to the size of the tumor as found at the pathological examination, but only to the presence or absence of a mass to be felt by palpation through the abdominal walls. In none of the cases was the tumor palpable as such.

Prior to operation the presence of a mass was noted in only four cases, or in 28.5 per cent., viz., in Kelly's case "b," in Harte and Willson's case "b," in Letulle and Weinberg's case "a," and in Moschcowitz's case "a." In Kelly's case there was to be palpated a mass three inches in diameter; in Harte and Willson's case also a considerable mass was to be palpated; while in Moschcowitz's case a small mass was noted; in all three of these cases the mass was due to a concomitant peri-appendicular abscess. It may be worth while to note here that in Harte and Willson's case "a" we find reported no distinct mass, but what appeared to be a thickened appendix could be palpated.

(4) *Rigidity*.—Rigidity was noted in four of the fourteen cases, or in 28.5 per cent., viz., in Kelly's case "b," in both Harte and Willson's cases, and in Moschcowitz's case "a." In the greatest majority of the cases reported, this symptom is not commented upon; and it is also noticeable that, as was to be expected, the rigidity was noted only in those cases which were accompanied by the more acute inflammatory lesions, as abscess or gangrene.

(5) *The Temperature*.—Very few, if any, deductions are to be made from the data regarding this symptom, as, with the exception of our three cases, the temperature is noted only in two others. One of these, Kelly's case "b," was accompanied by an abscess, and had a temperature of 103.2° F.; while in the second case, Harte and Willson's case "a," the acute inflammatory signs were so little marked that a practically normal temperature prevailed throughout the entire course.

In one of our cases, case "c," very high temperatures were noted both before and even for some time after the extirpation of the appendix. However, we are convinced that this remarkable temperature curve was not in the slightest degree due to the condition of the appendix. While the absolute proof is still lacking, our impression was that the temperature in this case was due to some form of autointoxication having its origin in the gravid uterus. This impression is confirmed by the fall of temperature after the evacuation of the uterine contents, in spite of the fact that even a most careful examination of the foetus, placenta, and membranes failed to reveal anything pathological.

(6) *The Pulse*.—The annotations regarding this point are so meagre in the various reports that absolutely no reliable deductions are to be made. As a matter of fact, we do not see that in the malady under discussion (unless very far advanced) the pulse-rate could be of any importance; any increase in the pulse-rate would be rather due to the accompanying inflammatory phenomena. In one of our cases, case "c," it is true there was a marked increase in the pulse-rate, but

this, as already stated under "temperature," was due probably entirely to extrinsic causes.

(7) *The Presence or Absence of Adhesions.*—The presence of adhesions was noted in seven of the fourteen cases, or in 50 per cent., viz., in Jessup's case, in Kelly's case "b," in Hurdon's case, in Rolleston's case, in Harte and Willson's case "b," in Letulle and Weinberg's case "a," and in Moschcowitz's case "a." Their absence was noted in four of the fourteen cases, or in 28.5 per cent., viz., in Harte and Willson's case "a," in McBurney's case, and in Moschcowitz's cases "b" and "c;" it was not noted in the others. To the writer, the question of the presence or absence of adhesions appears to be of considerable importance. It may be safely assumed that a growing carcinoma in the intestinal tract will sooner or later form adhesions to the surrounding viscera, particularly after the growth has invaded the serosa. However, after a careful study of the recorded cases, one naturally comes to the conclusion that in none of the cases was the involvement of the serosa so extensive that any existing adhesions could be definitely attributed to the actual presence of the new growth; on the contrary, it is our opinion that they were most probably due to the accompanying inflammatory process.

(8) *History of Previous Attacks.*—This, again, is a question of considerable importance in the study of the subject; however, not so much from the stand-point of symptomatology, but rather from that of prognosis. If it can be proven with a positive degree of certainty that all cases of carcinoma of the appendix have been preceded by undoubted attacks of appendicitis, or, better said, if it could be proven that a carcinoma, even if not always, but only sometimes, develops in appendices which have been the seat of a preceding acute or chronic inflammatory process, it would form another plea in favor of the radical procedure of extirpating every appendix which has been the seat of such an inflammatory process. But very little has been done in the study of this question; and it is decidedly to the credit of Letulle and Weinberg⁵ to have proven with some satisfaction the development of a carcinoma in two cases

of so-called "obliterating" appendicitis. In these two cases the carcinoma developed at the site of a stenosis, which in turn was caused by cicatrization of an ulcer in the mucosa. Harte and Willson also give expression to this view in their publication.

On looking over the various histories, we find a history of previous attacks in eight of the fourteen cases, or in 57.1 per cent., divided as follows as regards the number of the attacks and the duration of pain in the right iliac fossa. Rolleston's case had four attacks; Goffe's case had pain in the right iliac fossa for one year; Stimson's case had three attacks; in Harte and Willson's case "a" there were at least two attacks, and possibly more; in case "b" there were previous attacks (number not stated), and patient complained for a long time of almost continuous pain in the appendicular region; Letulle and Weinberg's case "a" had at least three attacks; McBurney's case had at least two attacks; Moschcowitz's case "a" complained for several months of pains in the right half of the abdomen.

There is no history of previous attacks of appendicitis in four cases, viz., in Kelly's case "b," in Hurdon's case, and in Moschcowitz's cases "b" and "c." The question is not discussed in the other reports. Of the twelve cases, therefore, in which this point is mentioned, we find a distinct history of previous attacks of appendicitis in eight cases; in other words, this means that in 66.6 per cent. the carcinoma was preceded by acute inflammatory symptoms. I concede very readily that the reverse might also be argued, namely, that the carcinoma was of older standing, and that all the symptoms were due only to its presence. This is not by any means impossible, when one considers that the growth, impinging upon the lumen of the appendix, must cause a stenosis; and it is well known that appendices which are stenosed from any cause give definite symptoms of appendicitis. While this may be brought as an argument by the over-cautious, it is more than probable that the obverse is the truth. Attention is called here again to the very able and convincing work of Letulle and Wein-

berg (*loc. cit.*). Abundant analogies might also be adduced from carcinomata in other regions of the body, where we not infrequently find these developing in cicatrices or on the basis of preceding ulcerations; it is an undisputed fact in pathology that malignant growths not infrequently develop as a result of long-continued irritation; attention is called here only to the scrotal carcinoma of chimney-sweeps and to the labial carcinoma of pipe-smokers, etc.

The preceding eight symptoms referred particularly to the localization of the tumor in the appendix; the following three symptoms bear more particularly upon the question of the presence of the malignant tumor.

(9) *The Age of the Patient.*—The study of this question has at all times received considerable attention in the making up of statistical reports on carcinoma; and, as a result of this study, the conclusion has been arrived at, that carcinoma, while by no means impossible, is at least seldom met with below the age of forty. Applying the question of age in carcinomata of the appendix, we find the following:

Letulle and Weinberg's case was twelve and one-half years old.

Goffe's case was fifteen years old.

Kelly's case "b" was nineteen years old.

Moschcowitz's case "b" was twenty years old.

McBurney's case was twenty-three years old.

Hurdon's case was twenty-four years old.

Harte and Willson's case "a" was twenty-four years old.

Moschcowitz's case "c" was twenty-four years old.

Harte and Willson's case "b" was twenty-five years old.

Rolleston's case was twenty-six years old.

Lartigau's case was thirty years old.

Jessup's case was thirty-six years old.

Moschcowitz's case "a" was thirty-seven years old.

Stimson's case was forty-four years old.

Whipham's case was forty-five years old.

Mosse and Daunic's case was fifty years old.

In five of the available twenty-one cases the age of the patient is not given. Leaving these five out of consideration, and utilizing for our analysis only the sixteen cases in which exact data are given, even at the first casual glance, one fact stands out in particular prominence, namely, the unusual early age in which carcinoma of the appendix predominates. In eleven of the sixteen cases, or in 68.7 per cent., the patients were at or below thirty; and in five only, or in 31.2 per cent., were they above that age.

It is customary, for the sake of more ready supervision, to tabulate material of this nature by decades; if this is done, we would find the following figures:

The first decade with no cases.

The second decade with four cases.

The third decade with seven cases.

The fourth decade with two cases.

The fifth decade with three cases.

What is the reason for this striking difference in carcinoma of the appendix when compared with carcinomata in other parts of the body? It has already been mentioned that carcinomata of the appendix not infrequently develop on the basis of old inflammatory processes; it is also conceded, and it has also been our experience at the Mount Sinai Hospital and in private practice, that in the greatest majority of instances appendicitis occurs in the second and third decades of life; the natural conclusion must be that carcinoma develops in appendices most frequently at that time of life in which the acute inflammatory processes in the appendix are most common.

In corroboration of this point, it is interesting to note that in none of the cases reported do we find an appendix which is the seat only of the new growth, but it is always accompanied by additional inflammatory changes. As this is, however, more in the realm of a pathological question, this will be discussed more in detail in that part of this work.

(10) *Sex*.—The sex of the patient is noted in sixteen of the twenty-one cases of my report. Of these twelve, or 75 per

cent., were females. I give these figures for what they are worth, without attempting any deductions. I do not know that there are any definite reasons which would predispose the female sex to the development of carcinoma in the appendix. With the exception of the occasionally present appendiculo-ovarian ligament, the anatomy is identical in all respects in both sexes. At all events, this great preponderance in the female sex is, to say the least, singular.

(11) *Heredity*.—Custom, perhaps, more than sound scientific principle, has devoted some importance to the question of heredity in cancerous disease. An examination of our cases regarding this point has revealed the following facts. In two cases we find a fairly distinct hereditary history. In Hurdon's case, a brother of the patient had a leg amputated for a "cancer;" and in Goffe's case, a grandmother of the patient had a cancer of the uterus, and an aunt a cancer of the breast. In the remainder there was either no history of heredity or there are no remarks regarding this point.

II. THE PATHOLOGICAL ANATOMY.

Under this heading we have to consider the following points: (1) The length of the appendix; (2) The size of the tumor; (3) The variety of the tumor; (4) The location of the tumor in the appendix; (5) The relation of the tumor to the walls of the appendix; (6) Accessory pathological findings. It is hardly necessary to remark that other questions, partly of a clinical nature, bear an important relation to the pathological anatomy, but, as these have already been considered in the clinical part, they will not again be repeated at this place.

(1) *The Length of the Appendix*.—The length of the appendix was noted in twelve cases, viz., the appendix was four centimetres long in Mosse and Daunic's and Letulle and Weinberg's case "a;" five centimetres in Kelly's case "b;" six centimetres in Jessup's case; seven centimetres in Moschcowitz's cases "b" and "c;" 7.5 centimetres in Moschcowitz's case "a;" ten centimetres in Hurdon's case; eleven centi-

metres in Kelly's case "a;" four inches in Stimson's and McBurney's cases; and fifteen centimetres in Harte and Willson's case "a." In Goffe's case the appendix is stated to be unusually long; in the remainder the length of the appendix is not given. In other words, appendices of all lengths have been found to be the seat of carcinoma; there is evidently no particular rule; if anything, it appears that in the majority of instances the appendices were longer than the average. At all events, it cannot be said that anything of value could be argued from this finding.

(2) *The Size of the Tumor.*—This point is of far greater importance than the one just spoken of. It is very much to be regretted that regarding this point some of the histories are absolutely silent. I have been able to find data only in fourteen of the reported twenty-one cases, viz., in two cases, Harte and Willson's cases "a" and "b," the tumor was only microscopical, *i.e.*, no tumor at all was to be seen on macroscopical examination; in Kelly's case "b" the tumor was also very small, *i.e.*, a cross section of the tumor occupied hardly three-fourths of the microscopical field when viewed with an A. A. Zeiss objective and a number two eye-piece; in Goffe's case the tumor was five millimetres in diameter; in Kelly's case "a" the tumor was six millimetres in diameter; in Letulle and Weinberg's case "c" the tumor was 1520 microns long and 143 microns wide; in McBurney's case the tumor was the size of a pea; in Letulle and Weinberg's case "b" the tumor was of the size of a cherry-pit; in Hurdon's case the tumor was one centimetre long and 0.5 centimetre thick; in Moschcowitz's case "a" the tumor was nine millimetres long and seven millimetres wide; in Moschcowitz's case "b" the tumor was 1.3 centimetres long and seven millimetres wide; in Moschcowitz's case "c" the tumor was 1.2 centimetres long and seven millimetres wide; and, finally, in Rolleston's case the tumor was the size of a marble. In Letulle and Weinberg's case "d" the size of the tumor could not be ascertained, on account of disintegration of the tissues; in the remaining eight cases the size of the tumor is not stated. In other words, it is seen that

the tumor varied very much in size; it varied from a microscopic size to that of a marble.

Of course, it would be an enormous advance in the diagnosis of carcinoma of the appendix if we could palpate the tumor; and it is by no means excluded that, everything being favorable, a tumor of the size of a marble, could possibly be palpated; but as was seen from the reported cases, a tumor of this size was present in only one instance; a majority of the tumors was very small, some only microscopic in size; it is seen therefore that this symptom, which would be the only sure sign of a carcinoma of the appendix, is almost beyond our possibility.

While there appears to be no doubt of the pathological diagnosis in any of the cases published, it is perhaps permissible to again call attention to the fact that a certain amount of care is to be paid in making the diagnosis of a carcinoma, particularly in those cases in which no tumor is to be seen macroscopically. Two of the cases in my list (Harte and Willson's cases "a" and "b") were, as already stated, so small that the carcinoma was discovered only in the routine microscopical examination. Judging merely from the description of the microscopical picture, and from the illustration attached (which, it is to be regretted, are merely reproductions of a very low power), there does not appear to be any doubt of the correctness of the diagnosis. Even without any reference to the cases in my list, it may not be amiss to sound a warning in making the diagnosis of a carcinoma in those cases in which no actual tumor formation is found; this warning applies particularly to tumors of the intestinal tract. It is only since studying this question that my attention has been called to the work of Askanazy,¹⁷ wherein he calls attention to the inflammation of the lymphatic vessels which accompany the sympathetic nerves, in inflammatory diseases of the peritoneum and intestines. We find in these cases the perineural lymph spaces more or less filled with cells, forming a picture not unlike that of a carcinoma alveolus; in a space where many of these lymphatics happen to be grouped together, the resulting

picture may very readily resemble such a tumor. As a matter of fact, Askanazy states that such findings have not infrequently been mistaken for carcinoma, viz., "Mir ist es sogar begegnet, dass ein nicht ungeübter Mikroskopiker mir die hier besprochenen Gebilde als mit Krebszellen injicirte Lymphgefässe vorlegte."

(3) *The Variety of the Carcinoma*.—Many endeavors have been made by me to arrive at some uniformity regarding the question of the variety of the carcinoma, but all attempts have been futile. The cases are so varied and manifold in their description that if all the characteristics are to be taken into account, practically each and every case would have to be described as an entity by itself, and but very little would be gained by such a procedure. As a general thing, it might be stated that most of the cases correspond to that type known as "adenocarcinoma;" some of the cases, again, respond more to the description of "alveolar carcinoma;" and, finally, others show combinations of these two. Neither will a description of the proliferating cells throw much light upon the subject, as even, in this respect, there does not exist any unanimity in the cases which devote some space to this discussion. We find, for instance, the following cells described as polyhedral cells, low columnar cells, oval cells, polymorphous cells, epithelioid cells, etc.

Our three cases are described by Dr. F. S. Mandlebaum, pathologist to the hospital, in the following manner:

CASE I.—I. S. The appendix is 7.5 centimetres long. Near the tip of the organ, and extending to within four millimetres of the tip, there is a well-defined tumor, nine millimetres long and seven millimetres wide, springing from the mucosa, and not seeming to infiltrate the muscular coats of the organ.

Microscopical examination of the tumor. At the site of the tumor, the normal lymphoid tissue as well as the mucosa are absent. The tumor itself presents in parts a general adenomatous appearance, and a lumen is seen in most of the cell clusters. In some places the epithelial cells become more atypical, and show a tendency to proliferate into the surrounding tissue. A firm

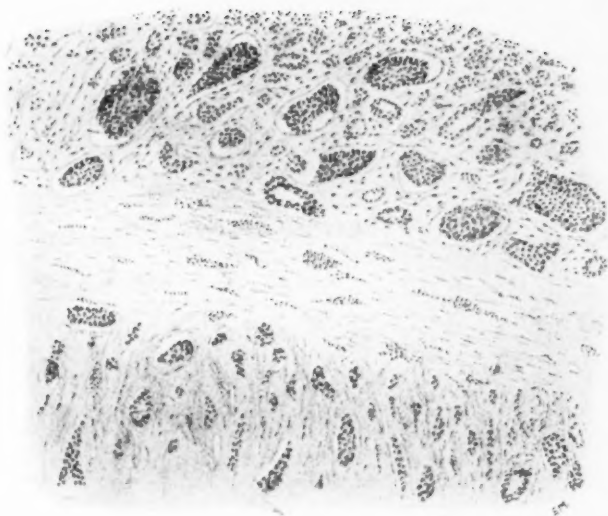


FIG. 4.—Adenocarcinoma of the appendix vermiformis.

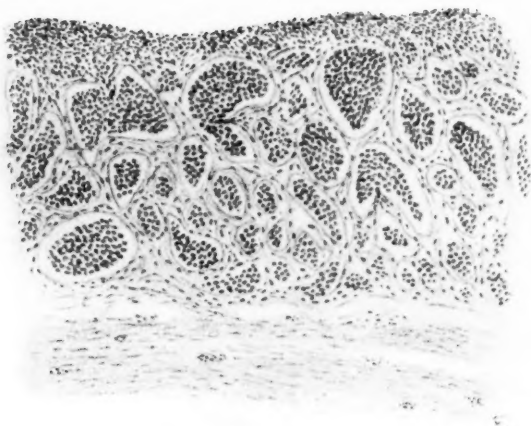


FIG. 5.—Medullary carcinoma of appendix vermiformis.



FIG. 6.—Medullary carcinoma of appendix vermiformis.

connective-tissue stroma is present between the various islands of epithelial cells. Considerable acute inflammation is noted, as evidenced by a large number of leucocytes and a moderate amount of small lymphocytes. The circular coat of muscle-fibres is not involved by the tumor, but presents the usual characteristic appearance of an acute inflammation, made apparent by a large collection of leucocytes running parallel to the muscle-fibres. The longitudinal layer of muscle-fibres, on the other hand, shows much involvement by tumor cells. The epithelial cells in this situation show the same general arrangement as in the tumor proper. The peritoneal surface is the seat of an acute purulent inflammation. No mitosis is apparent in the tumor. Auerbach's plexus appears quite normal. The mucosa at the edge of the tumor shows ulceration and acute purulent inflammation.

Diagnosis.—Adenocarcinoma of the appendix, with infiltration of deep muscularis; acute purulent inflammation (Fig. 4).

CASE II.—R. P. The appendix measures seven centimetres in length. A well-defined tumor is present 1.6 centimetres from the tip of the organ; the tumor is situated in the mucosa, and is 1.3 centimetres long, and seven millimetres wide.

Microscopical examination shows the following: The tumor springs from the mucosa, and does not infiltrate the muscularis, though at one place a slight extension into the submucosa has occurred. A well-marked capsule separates the growth from the surrounding tissues. No mucosa is left at the site of the tumor. The tumor proper consists of epithelial cells, arranged in nests, showing no tendency to the formation of any lumen; these nests are of various size and shape, and are all surrounded by fibrous connective tissue. A few leucocytes are scattered throughout the connective-tissue stroma. In one or two situations small collections of lymphoid cells are noted. The tumor is very rich in cells, and the stroma is somewhat scanty. No evidences of active cell division are seen. No changes are noted in the appearance of Auerbach's plexus.

Diagnosis.—Medullary carcinoma (Carcinoma simplex) of the appendix; moderate acute inflammation (Fig. 5).

CASE III.—M. G. The appendix is seven centimetres long. At the extreme tip of the organ there is a tumor, 1.2 centimetres long and seven millimetres wide. This portion of the appendix is distinctly enlarged by the presence of the growth, but not

until the appendix is cut open does the tumor proper appear visible. It is distinctly confined to the mucosa.

Microscopical examination. The growth is a typical medullary carcinoma, though at its free margin it somewhat resembles an adenocarcinoma in appearance. The connective-tissue stroma is only moderate in amount. Small groups of tumor cells are seen infiltrating both muscular coats of the organ. No mitosis is seen. Chronic inflammatory changes are present, principally on the surface of the tumor. Auerbach's plexus appears normal.

Diagnosis.—Medullary carcinoma of the appendix; chronic inflammation (Fig. 6).

(4) *The Location of the Tumor in the Appendix.*—The location of the tumor in the appendix is indicated in nineteen of the histories. The tumor was situated at or near the tip of the organ in nine cases, viz., in Goffe's case, in Letulle and Weinberg's cases "b," "c," and "d," in McBurney's case, in Lartigau's case, in Rolleston's case, and in Moschcowitz's cases "a" and "c;" in or near the proximal third in three cases, viz., in Kelly's case "b," in Wright's case, and in Whipham's case; between these two points in seven cases, viz., in Jessup's case, in Kelly's case "a," in Hurdon's case, in Harte and Willson's cases "a" and "b," in Letulle and Weinberg's case "a," and in Moschcowitz's case "b." The only matter of note in these findings is that only in a small minority, three cases, or in 15.7 per cent., was the tumor located at or near the cæcal end of the appendix; and it is not impossible that in a certain number of carcinomata of the cæcum the primary beginning of the growth may have been in the appendix and not in the cæcum. Attention to this point has already been called by a case operated upon at Thiersch's clinic, and reported by Beger,¹⁸ and by a case reported by Regling.²¹

(5) *The Relation of the Tumor to the Walls of the Appendix.*—Of more importance is the relationship which the tumor bears to the various coats of the appendix, particularly as to whether the carcinoma is primary in the appendix or only secondary to a carcinoma in another part of the body, more especially in some other intra-abdominal viscus. On look-

ing our list over, we find this relationship noted in fifteen of the twenty-one cases; and for the first time do we find a unanimity. This unanimity is so absolute that it is sufficient cause for the assumption that the rule holds good for all cases. In all these cases, from the largest to the smallest, no matter in what portion of the appendix the tumor was found, nor of what variety the carcinoma, the tumor was always situated in the mucosa, and, beginning in the mucosa, it infiltrates the other coats of the appendix. Corroborative of this point is the fact that the larger the tumor the deeper did this infiltration extend; in some of the larger cases even into the serosa.

Carcinomata of the appendix, therefore (as is to be expected), follows the general plan of primary carcinomata in other portions of the intestinal tract, namely, that they have their origin usually in the mucosa. This rule is so constant, that when one finds a tumor in the serosa of the appendix, in the course of an operation, it may be safely regarded as secondary rather than as a primary growth.

In this connection it is perhaps only just to again call attention to the correctness of the diagnosis in the case of Whipham (*loc. cit.*), which has rather frequently been doubted by subsequent writers. In Whipham's case there was found, in addition to the tumor in the appendix, also a carcinoma of the ovary as well as metastases in the liver and peritoneum. Upon this finding, and on account of the more frequent occurrence of carcinoma in the ovary, some subsequent writers have doubted the diagnosis of primary carcinoma of the appendix, and claimed the case to be a primary carcinoma of the ovary. On examining Whipham's article, however, we find it distinctly stated that the carcinoma was situated in the mucosa and submucosa, and from this point on it also infiltrated the muscularis. I believe, therefore, that Whipham has judged his case correctly, and that his case belongs justly in the list of primary carcinomata of the appendix.

(6) *Accessory Pathological Findings.*—Six of the cases make no statements regarding this point; in one case, Hurdon's, we find that the appendix was not markedly diseased;

in the remainder the appendix was distinctly diseased, varying from a simple catarrhal inflammation in the mildest to complete gangrene, with perforation, in the severest cases. In this connection, again, the question arises as to which was the primary and which the secondary lesion? Was the carcinoma primary, and was its simple presence sufficient to excite an inflammatory process? Or was the inflammation the primary lesion, and did the carcinoma develop upon it as a basis? It cannot be denied that there exists still a third possibility, namely, that both are absolutely independent lesions, and that they have nothing to do with each other. However, from a study of the cases, the writer has gained the impression that the weight of evidence is most emphatically in favor of assuming that the inflammatory process was primary, and that the carcinoma developed secondarily, upon the basis of the inflammation. This assumption is based upon the following factors:

(1) That no case (I except Hurdon's case, in which the statement is made that the appendix was not markedly diseased) has been reported in which no other lesion, excepting the carcinoma, was found.

(2) That practically all the cases reported (again I except Hurdon's case) were associated with some degree of inflammation.

(3) That in many of these cases we find mention of stenoses and of complete obliterations of the lumen of the appendix; lesions which must have existed a considerable time before the onset of the carcinoma.

(4) That the greatest majority of the cases give a history of one or more antecedent attacks of appendicitis.

(5) That the carcinoma in all cases begins in the mucosa, that is, in that coat of the appendix in which the inflammatory lesions are most marked.

(6) The accurate and painstaking deductions of Letulle and Weinberg (*loc. cit.*), which prove with certain conclusiveness that in their cases the carcinoma developed on top of an obliterating appendicitis. Letulle and Weinberg give the following *résumé* of their work: "A la suite d'une appendicite

ulcèreuse aiguë, et vraisemblablement nécrosante, terminée par symphyse de la couche sous-muqueuse (obstruction totale), une partie circonscrite (peut-être le cul-de-sac d'une glande de Lieberkühn non détruite) a été enclavée dans la cicatrice et est devenue, secondairement, l'origine d'une évolution cancéreuse. Ce cancer, ainsi développé au contact d'un tissu de cicatrice, a pu s'infiltrer successivement à travers les couches musculueuses et sousséreuses, sous-jacentes. Plus tard, l'infection carcinomateuse a fusé, par les voies lymphatiques sous-séreuses et remonté plus ou moins haut, le long des parties non obstruées de l'appendice; en même temps, les colonies carcinomateuses descendent vers l'extrémité libre." . . . "As a result of an acute ulcerative and probably gangrenous appendicitis, terminating by a union of the submucous coat (total obstruction), a circumscribed portion (possibly the cul de sac of an undestroyed gland of Lieberkühn) has been enclosed within the cicatrix, and has secondarily become the origin of a cancerous evolution. The cancer thus developed by contact from a cicatricial tissue has been able to infiltrate successively the various subjacent muscular and submucous coats. Later the carcinomatous infection has spread by the way of the subserous lymphatics, and has risen more or less into the unobstructed portions of the appendix; at the same time the carcinomatous columns descend towards the free extremity."

It is not my province to enter at this place into a detailed discussion of the genesis of carcinoma, but because the findings and theories of Ribbert¹⁹ are so eminently corroborative of the hypothesis set forth above, it is perhaps permissible to allude to this question. Ribbert claims that carcinomata are merely overgrowths of normal epithelium which has been detached from its normal site. This detachment, he claims, is the result of a previous inflammatory process, whereby the proliferating connective tissue penetrates between the epithelial cells, and ultimately encloses them in a sheath of their own. The epithelial cells, having been separated in this way from their normal habitat, proliferate in an abnormal manner and produce the lesions of carcinoma. In other words, Ribbert

assumes a primary inflammation in all cases of carcinoma, and our findings in carcinomata of the appendix substantially corroborate this view.

Résumé.—I have gone at some length into the discussion of the various signs, symptoms, and anamnestic data regarding the question of the primary carcinomata of the appendix; perhaps longer than the subject would warrant. In spite of this, it does not appear to me that, with our present knowledge, we have reached a stage where we can recognize the disease prior to operation, or, for that matter, even after operation, before the microscopical examination. We have, however, obtained the following data from our study:

(1) No exact figures can be given regarding the frequency of primary carcinoma of the appendix. It is certainly very rare, when compared with the enormous frequency with which the inflammatory diseases of the appendix occur. It is, however, not impossible that in time we shall have to modify our opinion regarding this point, as it appears that more and more cases are being reported, particularly in the last few years.

(2) It appears that all "primary" carcinomata of the appendix begin in the mucosa.

(3) It seems more than probable that all primary carcinomata of the appendix take their origin in some preceding inflammatory process.

(4) Primary carcinoma of the appendix is most frequent at that time of life in which the inflammatory diseases of the appendix are most frequent; and this accounts for the early age of most of the patients reported.

(5) Primary carcinoma of the appendix is more frequent in the female sex than in the male; the cases reported admit the ratio of three to one.

(6) If it shall prove true that primary carcinomata of the appendix originate in the inflammatory processes, it forms an additional argument for the removal of the appendix, once diseased.

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**EXCISION OF THE SCAPULA FOR PROGRESSIVE
CHRONIC INTERSTITIAL MYOSITIS ASSO-
CIATED WITH OBLITERATING
ENDARTERITIS.**

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THE history of this very rare case may be summarized as follows: E. D., aged eight years, colored, was admitted to the Pennsylvania Hospital, December 9, 1901. He had fallen upon his left shoulder two months before. An abscess followed the contusion and pointed near the summit of the shoulder. After healing, it reopened in a few days, and there remained a sinus, which continued to discharge freely, and communicated with what appeared to be carious scapula. A month later a mass of almost bony hardness began to develop over the body of the scapula, and a skiagraph taken at that time clearly indicated that the mass was in part, at least, composed of bone. Four months later the mass having continued to grow into a dome-shaped tumor, which corresponded in outline to the body of the scapula, the child was etherized and the scapula excised. Preparatory to the excision, an exploratory incision was made half an inch to the upper side of the inner border of the scapula. A fragment of the mass was removed, and a hasty examination of a frozen section led to the conclusion that the growth was a sarcoma. The operation was proceeded with after the method of Ollier, all of the tissues overlying the bone, except the integument, being removed with the latter. The only detail of the procedure that may be mentioned was the easy arrest of hæmorrhage obtained by getting perfect control of the bone with heavy lion-jawed forceps. In this way, after the superficial attachments had been divided, it was possible to elevate the bone and clearly expose vessels as they were divided.

The child made an uneventful recovery, there being moderate suppuration for a short time, when the wound closed permanently. An examination of the growth subsequently made proved that it



FIG. 1.—Excised scapula.

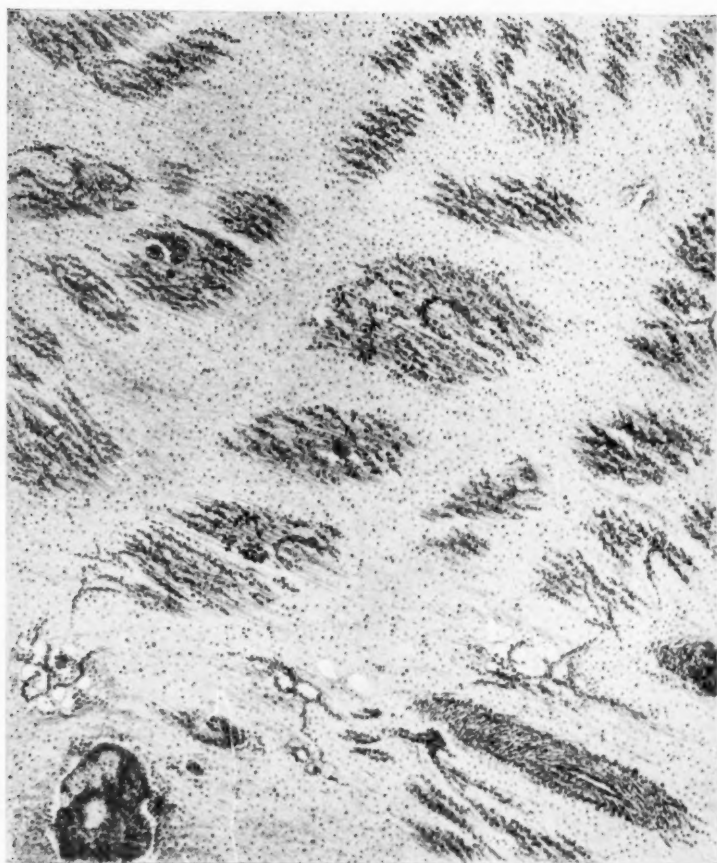


FIG. 2.—Chronic interstitial myositis.

was not one of a sarcoma, but of progressive chronic interstitial myositis associated with obliterating endarteritis.

Sections through the muscles attached to the scapula show the following condition reported from the Ayer Laboratory:

The muscle-fibres in some sections are separated by a large amount of fat. Between the fat, the muscle-cells lie either in single narrow bundles with proliferation of nuclei and irregular ill-defined striations, or in small masses composed of several such muscle-bundles. In other sections areas of muscles have undergone complete degeneration, only here and there the nucleus retaining the stain. Between these areas the muscle-bundles are seen, some of them partially degenerated, others small, without striations and showing proliferation of the nuclei. Many of the fibres are broken and curled. In cross-section they bear a close resemblance to epithelioid cells with ingested nuclei. These areas of degenerating muscle are infiltrated with small and round cells, epithelioid cells, and a few polymorphonuclear leucocytes. About the cells are masses of small round cells with deeply staining nuclei. Capillaries are numerous in all these areas. In other sections the complete degeneration of the muscle is not so extensive, and here the masses of partially degenerating muscle comprise the greater portion of the section.

In all the vessels a very marked endarteritis is present, which becomes obliterative in the smaller vessels and almost closes the larger ones.

A functional recovery of the upper extremity eight months after the operation was remarkable. The child could push and pull with the arm with considerable force. His general condition was satisfactory, and there was no sign of recurrence of the disease. In connection with this case, it may be interesting to review the following list of similar operations, the very large proportion of which have been done for sarcoma.

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**INSTRUMENTS FOR USE THROUGH CYLINDRICAL
RECTAL SPECULA, WITH THE PATIENT
IN THE KNEE-CHEST POSTURE.**

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For examining the rectum in its different portions from the anal orifice up into the sigmoid flexure, I have had a great variety of specula made, from the very shortest, not much over an inch in length, to the longest, about thirty centimetres; the diameter of these specula varies from about four centimetres down to one and one-half and one centimetre. The smallest sizes are necessary in examining through strictured

FIG. 1.



Rectal scoop.

areas. I have thus had upward of forty specula made altogether, many of them being devised simply to fit particular cases.

My method of examining and treating the rectum under air inflation, naturally induced in the knee-chest posture by elevation of the pelvis, has also brought with it the necessity for certain auxiliary instruments for removing pieces of tissue, for swabbing, for treatments, etc.

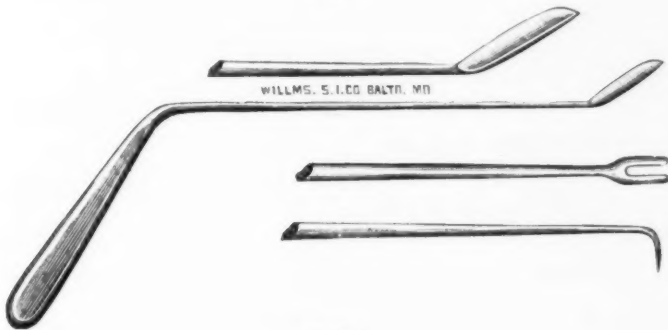
Some of the instruments I have gradually accumulated

for these purposes are the following: a scoop, a packer, a powder insufflator, alligator forceps, tenacula, tenaculum forceps, scissors, and knives.

These instruments all necessarily have two features in common,—a handle, about eight or ten centimetres in length, bent downward at an angle of 45 degrees from the instrument proper, and a shank long enough to be used through the longer specula, that is to say, from fifteen to twenty-five centimetres in length.

The rectal scoop (Fig. 1). The scoop is a little spoon on the end of one of these long handles, bent at an angle of about 70 degrees to the shank of the instrument, in a direction opposite to that of the handle, used to clear the bowel or the lumen of the speculum of any faecal masses which enter it.

FIG. 2.



Packer.

The packer (Fig. 2). The packer is simply a blunt fork like my vaginal packing instrument, used for carrying cotton or long strips of gauze through the speculum and packing it into the bowel, so as to make a prolonged application to a diseased area. Sometimes I tampon or fill up the rectum for several inches in this way, leaving a string hanging outside of the bowel by which the tampon can be withdrawn. At other times I leave the tampon *in situ* without any string, expecting the foreign body to be passed when the bowel is moved naturally. Cotton tampons often pass without the patient being aware that the evacuation is other than a normal one.

Powder shovel (Fig. 3). The powder shovel is used with an insufflator to convey powder up into the bowel beyond the end of the speculum. The powder is then diffused over the

FIG. 3.

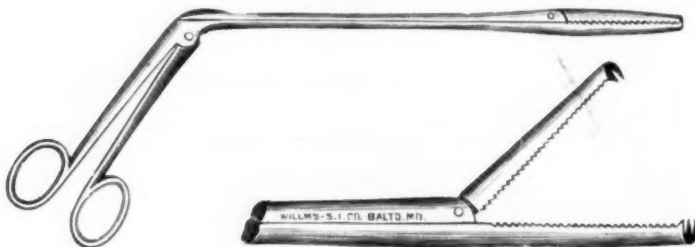


Powder shovel.

diseased surface by insufflation, through compressing a rubber ball attached at the end of the tube.

Alligator forceps (Fig. 4). The alligator forceps resembles those used by throat specialists, only they are larger, the jaws being two and one-half centimetres in length and four millimetres in width. These are provided with teeth at the end to hold the tissue grasped.

FIG. 4.



Alligator forceps.

Tenaculum. The tenaculum is simply a uterine tenaculum about twice the ordinary length. It is valuable in transfixing and lifting up a bit of tissue to be removed by the scissors.

Scissors (Fig. 5). The scissors are made with a bent handle like the other instruments and with long shanks about twenty centimetres to the lock; they work in a vertical direction. In one pair of the scissors I have had the cutting surface made about three centimetres in length, with fine saw-teeth on each blade. These are invaluable in snipping off little pieces of suspected tissue for microscopic examination.

Tenaculum forceps (Fig. 6). The tenaculum forceps is made to work like the alligator forceps, and serves to pick up cotton or catch any other foreign body lodged high up in the rectum.

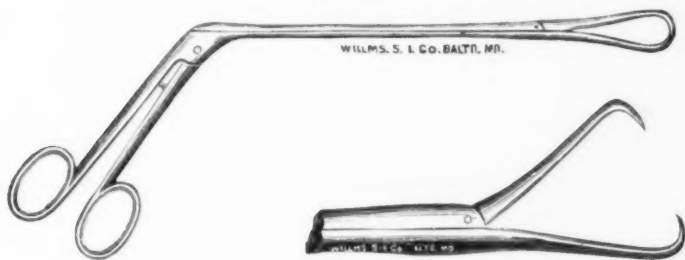
FIG. 5.



Saw-teeth scissors.

Knife. The knife is also made in the way common to all, with a delicate blade one and one-half centimetres long by three millimetres in width, turned upward at an angle of about 35 degrees.

FIG. 6.



Tenaculum forceps.

I have also devised a needle, on a long arm like the other instruments, with an eye in the end for the purpose of carrying a piece of silk through the pedicle of a polyp at any point in the bowel above the ampulla, with the expectation of catching the silk and drawing it out of the eye with the tenaculum after the transfixion. The needle should then be withdrawn and the ligature tied, making counterpressure at a point beyond the tumor with the fork of the packing instrument.

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, February 11, 1903.

The President, LUCIUS W. HOTCHKISS, M.D., in the Chair.

PERFORATING ULCER OF THE STOMACH.

DR. JOHN F. ERDMANN presented a man, thirty-seven years old, a tailor by occupation, who was seen in consultation with Dr. D. H. Jones, on January 18, 1903, at three o'clock in the afternoon. The patient stated that on the previous day, just eighteen hours before his admission to the hospital, he had a sense of uneasiness in his abdomen following a light lunch, and was suddenly seized with a sharp attack of pain, constant, but with cramp-like exacerbations, extending from right to left above the umbilicus. At its onset the pain was most intense in the epigastrium; it became generalized after a few hours, but upon deep pressure the point of greatest pain was still in the region of the pit of the stomach. He also complained of marked tenderness in the region of the appendix. The right rectus was rigid at the usual segment, as seen in appendicitis, but, in addition, the upper segment was more rigid and resistant.

A diagnosis of perforation of the stomach or duodenum was made, and the abdomen was opened through the upper segment of the right rectus. Upon opening the peritoneal cavity, a bile-stained, cloudy fluid was extruded; this contained flakes of fibrin, but no food particles. The surrounding viscera were congested and covered with fibrin flakes. After sponging out five or six ounces of bile-stained fluid from Morrison's pouch and this region, the general peritoneal cavity was walled off with gauze pads and a search made for the duodenal portion of the stomach. On

the anterior wall of the stomach, near the lesser curvature, and half an inch from the pylorus, a perforation about the size of a crow's quill was found, through which gas and a yellow fluid were escaping. The opening was round and clean-cut, and surrounded by an area of infiltration about the size of a silver quarter. The opening was closed with three purse-string sutures, and, after sponging Morrison's pouch and the exposed area with peroxide of hydrogen and salt solution, the abdomen was closed, without drainage.

The patient made an uneventful recovery, with the exception of a subcutaneous hæmatoma which developed in the site of the incision, and later broke down and was drained. He was given nothing by the mouth until the eighth day, when small quantities of milk and peptonized broth were allowed, and during the past week he had taken solid food. A careful inquiry into his history preceding the onset of his attack of pain failed to elicit any symptoms of gastric disturbance.

PERFORATING ULCER OF THE STOMACH.

DR. JOSEPH A. BLAKE presented a man, forty-seven years of age, who was admitted to the Roosevelt Hospital on December 4, 1902, with the following history: The previous and family history was negative. For eleven years he had attacks of epigastric pain, sometimes accompanied by tenderness in the right iliac fossa. These attacks bore no relation to the ingestion of food, and lasted only from two to five hours. There had been no attacks in two years. There was an indefinite history of slight indigestion.

At 9 A.M. on the morning of admission, he experienced a sudden very severe pain in the epigastrium, accompanied by nausea but not by vomiting, and by extreme tenderness of the whole right side of the abdomen. The pain was so severe as to be unbearable. He was brought to the hospital at 11 A.M. still in severe pain. The abdomen at that time was scaphoid; there was marked general rigidity excepting the left lower quadrant. The liver-dulness was normal. The tenderness was most marked at the upper part of the right rectus and at the right iliac fossa. He was given eight minims of Magendie's solution.

The temperature was 100° F.; pulse, 78; respirations, 24. When seen by me six hours later there was no pain whatever. The abdomen was not distended, and percussion was normal;

there was only slight tenderness at the upper part of the right iliac fossa and at the upper part of the rectus abdominis. The rigidity had also disappeared, with the exception of a slight amount over the upper part of the right rectus. The temperature and pulse were the same as on admission. The leucocyte count was 16,000. This and the history of severe pain and rigidity decided him to operate.

The diagnosis was in doubt, but ulcer of the stomach was practically excluded on account of the subsidence of the symptoms, and from the fact that there had been no gastric history. An incision was first made over the appendix, and it was found bound down by old adhesions and surrounded by an abundant seropurulent exudate. It was removed before it could be demonstrated to be intact. The pus was coming from above, and the characteristic odor of stomach contents was noted. An incision was therefore made in the median line above the umbilicus and a perforated ulcer at the anterior surface of the pylorus found. The diameter of the perforation was seven millimetres, of the ulcer and its indurated margin, 3.5 centimetres. The stomach contents were flowing freely from it. As more than half of the pyloric ring was involved, an excision and pyloroplasty were done, the line of suture running at right angles to the axis of the gut. Silk was used. The portion removed measured 4.5 by 3.5 centimetres. The peritoneal cavity was washed out and closed.

Convalescence was uneventful, the temperature never going above 101° F., and reaching normal in four days.

DR. ERDMANN said he wished to emphasize the point brought out by Dr. Blake, that digestive symptoms may be entirely absent in these cases. At a recent meeting of the Surgical Section of the New York Academy of Medicine, this question came up for discussion, and one of the speakers had insisted that in all cases of ulcer of the duodenum or the duodenal portion of the stomach the gastric symptoms were well marked. Dr. Erdmann said this was not in accord with his own experience, which covered six cases, in five of which he had operated. In all of the cases the perforation was in the duodenum, and in none of them were there any digestive disturbances; no vomiting or intestinal discharge. In the case of perforation of the stomach which he had just presented, there were absolutely no gastric symptoms. The only point of interest in the patient's previous history was that nine years ago

he got rid of a tapeworm. In his remarks regarding the absence of gastric symptoms, Dr. Erdmann said he limited himself to cases in which the perforation was in the duodenum or near the duodenal orifice of the stomach.

DR. HOTCHKISS said he thought it was Mayo Robson who had called attention to the fact that a perforation of the stomach or duodenum not infrequently simulated appendicitis on account of the rapid gravitation of the liquid to the right iliac fossa and gave rise to acute symptoms in that region.

The speaker said he was glad to note the fact that in Dr. Blake's case, as well as the one shown by Dr. Erdmann, the wound was closed without drainage. In the only two cases of this kind that had come under his care, Dr. Hotchkiss said he had resorted to immediate closure of the wound. In one of the cases Morrison's pouch was filled with débris; this was sponged out, washed with H_2O_2 , followed by abundant salt solution, and the wound closed entirely. This patient recovered. In the second case, which was one of perforation of the posterior wall of the stomach, with a very wide-spread peritonitis, the patient died in twenty-four hours.

DR. BLAKE said that in a case which he recently had in the hospital the perforation had existed for a week at the time of operating. There was a large collection of pus in the left upper segment of the abdomen, which ruptured into the general peritoneal cavity on the day of the patient's admission to the hospital. The peritoneal cavity was freely washed out and drained, and for the following ten days her condition was so satisfactory that her recovery was predicted. On the tenth day, however, she was moved to another ward, and exerted herself to some extent, possibly breaking down some adhesions. At all events, on the following day her pulse and temperature went up, and she died four or five days later of general sepsis.

DR. ERDMANN said that in certain instances, after perforation of the stomach, the *Bacillus pyocyaneus* had been found in the discharged gastric contents. In one of his own cases these bacilli were found in large numbers, and the patient died in a peculiar condition of coma, which was attributed to the presence of this micro-organism.

ADÉNOLIPOMATOSE SYMÉTRIQUE.

DR. ERDMANN presented a man, thirty-one years old, an alcoholic, who, about August, 1902, noticed that his neck had enlarged to a great extent, requiring several sizes increase in his collar. He thinks it grew to twice its size in thirty days. No pain in the growths, but they are uncomfortable. There is no pain or difficulty in swallowing or speaking. The first evidences of enlargement were noticed behind and below the ears. His wife had noticed an enlargement of his neck for a year.

Examination now shows a series of semifluctuating, lipomatous-like, circumscribed masses, bilateral in their arrangement in the following situations: postcervical and suboccipital, anterolateral cervical, submental region, supraclavicular, and some few nodules on the chest wall. These tumors the patient states apparently increased and then decreased in size. These masses, as a result of their symmetrical arrangement and their anatomicopathological structure, have been given the name, by the French, of *adénolipomatose symétrique*. This condition is usually found in the male, and patients suffering from the disease are said to be prone to tuberculosis.

DIFFUSE PERITONITIS.

DR. BLAKE presented a girl, aged twelve years, who was admitted to his service at the Roosevelt Hospital, July 2, 1902, at 11 P.M., with a diagnosis of gangrenous appendicitis and spreading peritonitis. She had had one attack of appendicitis four years before. The present attack was of two days' duration, commencing with characteristic pain and vomiting, which persisted until admission.

On admission, her temperature was 101.6° F.; pulse, 124; respiration, 44. There was a marked degree of prostration, facies abdominalis, tongue coated, lips red and dry. There was no general abdominal distention; the liver-dulness was normal, general abdominal rigidity and tenderness most marked in right iliac fossa. In view of Dr. Ochsner's and Dr. Mayo's views expressed at the last meeting of the American Medical Association, he decided to try their treatment of such cases. Therefore the stomach was washed out, the rectum was emptied with a simple enema, and an ice-bag applied.

Ten hours later the abdomen was distended, and there was loss of liver-dulness; the pulse was 144, irregular, of poor force, and the respirations were 36.

Operation was then performed. Kammerer incision three inches in length. The appendix was found perforated; the whole right side of the abdomen and pelvis was full of yellow pus; the left side, and even the region about the spleen, was filled with white pus.

The parietal and visceral peritoneum was congested and covered with fibrinous plaques. After removal of the appendix, the abdomen was washed out with large quantities of saline solution until the return was clear; it was then partially dried. The abdominal wound was then closed in layers. *No drainage was employed.* The duration of the operation was thirty-one minutes. During the operation a large saline infusion was given.

The after-course was characterized by marked sepsis. The abdominal wound, infected apparently from the peritoneal cavity, suppurated. Finally, in two weeks there was improvement, and then shortly the temperature began to become irregular and rise, and an indefinite mass was made out in the left iliac fossa. The original wound by this time was nearly healed.

An incision was made in the left side, and an abscess in the left iliac fossa and upper part of the pelvis was evacuated. This was followed by temporary improvement, but in a short time another abscess was found and emptied, which was situated above the other and separated from it by the sigmoid mesocolon. The convalescence after this was gradual but steady, and she left the hospital on August 31, nearly nine weeks after her admission.

The chief points of interest in this case are, firstly, the delaying of the operation, which in this case certainly did not better the patient's condition; secondly, the closure of the abdomen without drainage, and the development of secondary abscesses at a point which would not have been drained had drainage been instituted.

The speaker said that he had treated a number of such cases without drainage, and, as far as he could state at present, the percentage of recoveries was greater than with drainage.

In these cases deep infection of the abdominal wound is apt to occur, apparently from the peritoneal cavity. In one other case, done at about the same time as this, a subphrenic abscess

developed as a late complication, which was opened, and the patient made a good recovery. In his other cases no such complication had arisen.

DR. HOTCHKISS said that in a recent case of diffuse peritonitis which was not as extensive as the one shown by Dr. Blake, he sewed up the peritoneum, and then drained the space external to it. He thought that by this practice, in certain cases, infection of the wound might be avoided.

After the appendix had been removed, he thought the absorptive power of the peritoneum could be relied upon to deal with remaining fluids far better than artificial drainage; and he regarded the removal of the diseased appendix in every possible case as the essential feature to the success of the procedure.

DR. BLAKE said that in these cases of diffuse peritonitis he was in favor of draining the superficial wound after closing the peritoneum. Before he resorted to this method, he had in a number of instances suppuration of the wound follow complete closure of the abdomen. By draining the external wound, however, his results had been better.

Dr. Blake said the peritoneum seemed to possess a wonderful power in the way of getting rid of infectious products. The most essential thing, in dealing with these cases, was to remove the source of the infection. Ochsner and Mayo had reported cases of diffuse peritonitis in which they obtained good results by washing out the stomach, and then keeping the patient completely at rest for a few days before undertaking an operation. The speaker said that in the case he had shown, he started in to treat the patient along those lines, but the outlook after ten hours became so serious that an operation was immediately done to save the patient's life. In those cases where the operation is delayed, the peritoneum must not only take care of the exudate, but also of the cause of the infection. It therefore seemed reasonable to remove the appendix, if that is the cause, and then institute the rest treatment of the peritoneum.

RUPTURE OF THE INTERNAL MENISCUS OF LEFT KNEE.

DR. BLAKE presented a young man who was operated upon by him three weeks before for a rupture of the internal meniscus of the left knee. Seven weeks before he had slipped on an icy side-walk, and a man who was walking with him fell against his

extended leg, causing a severe wrench of the knee; this was followed by an effusion into the joint and an inability to extend the leg on thigh within twenty degrees of the normal, which deformity persisted until the operation.

At the operation the internal meniscus was found split for practically its whole length, the fissure extending through the thick peripheral portion about two millimetres from the attachment of the coronary ligaments. The split-off portion remained attached at both extremities in front of and behind the crucial ligaments. These attachments were divided with a tenotome, and the fragment, which was five centimetres long and a centimetre wide at its widest part, removed. The sharp edge of the fragment was frayed out, evidently from inclusion and pressure between the tibia and fibula.

The wound healing was perfect. The motions are unimpeded, except extreme flexion beyond ninety degrees, and he is now beginning to walk without inconvenience.

PRIMARY TYPHOIDAL PERFORATION OF THE GALL-BLADDER.

DR. JOHN F. ERDMANN read a paper with the above title, for which see page 878.

DR. BLAKE asked Dr. Erdmann whether there was much inflammation or gangrene of the gall-bladder wall in the case he had reported in his paper. The speaker said he had had two cases of spontaneous rupture of the gall-bladder, and in neither of them was there any necrosis of the bladder-wall. One case was that of an elderly woman whose gall-bladder was somewhat distended. In the other case, which was still under treatment, there were no stones in the gall-bladder, but there were some evidences of a cholecystitis. The contents of the bladder had not escaped, this having been prevented by adhesions to the lesser omentum. In both cases the gall-bladder was removed. In the first case, the rupture had existed for a week, and a general peritonitis had followed the secondary rupture of a localized purulent collection. The patient died. In the second case, the contents of the gall-bladder were clear, and the patient was making an uneventful recovery.

DR. ERDMANN, in reply to Dr. Blake, said the mucous surface of the gall-bladder was studded with a number of small

ulcers, which had evidently originated in the follicles, and one of these had burrowed down through the mucous and muscular coats, leaving only the serous coat, which had become distended with bile and finally ruptured. The tissues of the gall-bladder were very friable. There were no adhesions.

DR. ROYAL WHITMAN said that apparently this condition of primary typhoidal perforation of the gall-bladder could only be positively recognized by direct examination, either at autopsy or operation. It did not follow, then, that because twenty-seven non-operative cases had been discovered at autopsy, all cases died from this complication. The statistics quoted were therefore of little value other than to prove that a certain proportion of operative cases recovered. His criticism was, of course, purely from a statistical stand-point.

LITTRÉ'S HERNIA (STRANGULATED PARTIAL ENTEROCELE).

DR. HOTCHKISS presented a specimen with the following history: A man, sixty-four years old, was admitted to hospital during the evening of February 9 of the present year with a history of having suffered for three years from a small hernia which had always been easily reducible, but on the previous evening (February 8), while the patient was at supper, it slipped from underneath the truss, and he was unable to replace it. It began to swell, and a small cyst-like tumor appeared in the upper part of the scrotum, which was irreducible. The following morning he commenced to vomit, and had a little pain in the left side of the abdomen, but none over the tumor, which was slightly tender on pressure. The bowels were moved by an enema, but no gas was passed.

On admission to the hospital, there was no abdominal distention, and the pain was inconsiderable. A cyst-like, rather tender mass was felt in the scrotum. No hernia was palpable in the canal at that time. The patient's temperature was 100° F. He was put to bed and given an enema, which produced a large movement, but no gas. He slept fairly well that night, and the following morning he did not vomit or complain of any pain. The abdomen was slightly tender, but there was no distention, and no mass could be felt in the ring. The canal appeared to be occupied by a somewhat tender and slightly enlarged cord. The

patient soon afterwards began to suffer from hiccough, and when Dr. Hotchkiss first saw him on Tuesday afternoon, it was decided to operate. The cyst proved to be the hernial sac, distended with bloody fluid, and when the canal was slit up, a knuckle of what proved to be small intestine, bluish in color, was found tightly grasped in the neck. The case was a typical partial enterocele, involving two-thirds the cylinder of the small gut. This was gangrenous, and necessitated a resection and an end-to-end anastomosis with Murphy's button.

DR. GEORGE D. STEWART referred to a similar case which he saw at St. Vincent's Hospital. The patient was a woman, who had a swelling which was regarded as an inflamed gland by one physician whom she consulted. There was no obstruction of the bowels, no tympanites, and very little pain or temperature. After forty-eight hours her symptoms became slightly aggravated, and an incision revealed a femoral hernia. The loop of small intestine, which was pinched in the femoral ring, had only been partially occluded, which explained the mild symptoms.

In another case recalled by Dr. Stewart, the patient was a man who was suffering from inguinal hernia. The symptoms were very severe, and an immediate operation was done. Nothing but omentum was found in the hernial sac, and the condition of the omentum was not such as to explain the symptoms of shock and sepsis from which the patient was evidently suffering. A further search was thereupon made, and at the bottom of the hernial sac some curious bodies were found, which proved to be pieces of chestnuts that he had eaten a few days before. These had escaped through a disk-shaped perforation in the small intestine. The latter had become reduced after sloughing was complete, and had infected the entire peritoneum. The man died in a few hours of a general peritonitis.

DR. WOOLSEY said he had seen two cases of Littré's hernia, one inguinal and one femoral. The latter was in a woman in whom the gut could be replaced after being enveloped in gauze moistened in hot saline solution over night. The speaker said he had recently operated on a curious hernia of the inguinal region which had been completely strangulated for six days. There was a tense swelling behind the external ring and the inguinal canal. On slitting up the latter, a large sac was exposed lying still further outward and upward and containing a mass of omentum

and a loop of purplish gut. This sac lay behind the conjoined tendon, and apparently in front of the transversalis fascia. The internal ring, where the constriction occurred, was just internal to and nearly on a horizontal line with the anterior superior iliac spine. At this constriction the gut was gangrenous and perforated. The omentum was resected, also eight inches of the small intestine, and an end-to-end anastomosis made with a Murphy button. There was considerable hæmorrhagic infiltration of the mesentery, corresponding to the resected gut, which was also removed.

About twelve hours after the operation flatus passed freely, and the bowels were moved during the next twelve hours. From this time on the progress was favorable, the bowels moving regularly for the first five days. On the sixth day the patient suddenly became worse and died. On the autopsy, the button was found five or six inches below the line of anastomosis, and there was a small perforation just above where the button lay. The cause of this perforation could not be determined. The line of anastomosis was tight, but could be easily separated by moderate traction.

Stated Meeting, February 25, 1903.

The President, LUCIUS W. HOTCHKISS, M.D., in the Chair.

IMMUNITY FROM RECURRENCE AFTER REMOVAL OF GLANDULAR SARCOMA OF THE NECK.

DR. FORBES HAWKES presented a woman, forty-one years old, who was first seen by him in 1898, when she had a tumor, about the size of a hen's egg, on the left side of the neck, which she stated she had first noticed about a year before. The growth was removed and submitted to Dr. Thatcher and Dr. Tuttle, who pronounced it a glandular sarcoma of the small, round-celled variety. Almost five years had elapsed since the operation, and there were no signs of a recurrence.

DR. F. KAMMERER said that his personal experience with

sarcomatous growths originating in the glands of the neck had been very unsatisfactory. In spite of very thorough removal, there was usually prompt recurrence. In dealing with these cases, the speaker referred to the importance of giving potassium iodide a thorough test, so as to exclude the possibility of syphilis. He referred to a case of his own in which a growth of the neck which was regarded as a sarcoma had disappeared after a few weeks of the iodide treatment. Esmarch many years ago had called attention to this class of tumors.

DR. ROBERT H. M. DAWBARN said he thought it was always worth while in these cases to give the iodide treatment a trial, no matter what the report of the pathologist might be. He recalled a case reported by Dr. Gerster where a man had a growth involving the thigh. It was apparently a round-celled sarcoma, and a competent pathologist who was given a section for microscopic examination said there was no doubt as to the diagnosis. Before amputating the limb, however, it was thought worth while to try potassium iodide, and under this treatment the growth rapidly disappeared, and no recurrence had taken place.

BONE CYST OF THE SUPERIOR MAXILLA.

DR. HAWKES presented a man, forty years old, who four months ago first noticed a swelling on the upper jaw on the right side, which gradually increased in size until the lip bulged out fully one inch. It gave rise to only slight pain, and his health was not impaired. There was no pain in the teeth.

When Dr. Hawkes first saw the patient, on February 6 of the present year, an examination of the growth showed that it was apparently cystic. Upon the insertion of a needle, about an ounce and one-half of yellowish, mucoid fluid were withdrawn. An incision was thereupon made into the cyst through its anterior wall, which contained no bony tissue. This revealed a deep cavity (capacity about two ounces) involving the antrum, where the cyst had probably originated. There was no suspicion of malignancy.

DR. DAWBARN inquired whether there was any softening of the bone in the case shown by Dr. Hawkes. The speaker said that in a number of cases he had found that one of the very earliest signs of malignancy in this region was the softening of the bone, which could be readily determined by means of an

ordinary sewing-needle. As a standard of comparison, the opposite jaw-bone could be used. In a case which he showed here a few years ago, the diagnosis of a malignant growth of the bone of the upper jaw was made by this test alone, as the growth filling the antrum had as yet produced no outside swelling. The microscope subsequently showed that it was a round-celled sarcoma. In that case the needle was passed through the upper jaw with comparative ease,—about the same degree of resistance as with cartilage.

DR. HAWKES said that in the anterior part of the cyst (that is the portion above the teeth) there was no bone tissue at all. After the soft contents of the cyst had been removed, there was a thin layer of fibrous tissue, which was wiped off with the sponge. The bone surrounding the cyst was quite hard, even harder than normal bone, and it did not present any appearance of malignancy.

In another similar case, which he hoped to show later, the cyst originated in the upper part of the superior maxilla. The outer layer of bone had become absorbed, and the cyst was lined with a light layer of fibrous tissue. In that instance the wound healed in about three weeks, and there was no recurrence.

SUPERNUMERARY THUMB (ADULT).

DR. HAWKES presented a man, twenty-five years old, from whose right hand a supernumerary thumb had been removed. The patient was a butler by occupation, and the extra thumb had inconvenienced him in the proper discharge of his duties. The accompanying cuts (Figs. 1 and 2) show the condition.

GASTRO-ENTEROSTOMY FOR BENIGN STENOSIS OF THE PYLORUS.

DR. GEORGE WOOLSEY presented a man, fifty-two years old, who was referred to him for operation by Dr. William Armstrong in January, 1902. The history he gave was that he had been sick for over a year, his most pronounced symptom being frequent vomiting. The vomited matter frequently consisted of food that had been taken twenty-four or forty-eight hours previously. According to Dr. Armstrong's report, repeated chemical analyses of the stomach contents showed a normal or slightly increased percentage of free HCl, and a good digestion of the test meal.



FIG. 1.—Supernumerary thumb.



Right thumb. Left thumb.
FIG. 2.—X-ray photograph of thumb, taken before operation.

The lower margin of the stomach reached four inches below the umbilicus, but the motility of the organ was not greatly impaired.

As the patient failed to improve under medical treatment, it was decided to operate. The stomach was opened through a median incision, and upon inspection the pylorus was found to be much thickened and stenosed and somewhat bound by adhesions. A gastro-enterostomy was thereupon done, the jejunum being attached, by means of a Murphy button, to the anterior wall of the stomach at its most dependent portion, close to the greater curvature. The patient's convalescence was uninterrupted, and his stomach symptoms have practically disappeared. The button was passed on the twenty-second day. Since the operation, the stomach has greatly diminished in size, and the patient has gained over fifty pounds in weight.

Dr. Woolsey said he had shown this patient principally to illustrate the fact that it made no difference whether an anterior or posterior gastro-enterostomy was done, providing the opening was made at the most dependent part of the stomach, so that good drainage was secured. This point had recently been emphasized by Mayo.

Dr. F. KAMMERER said he did not appreciate the force of the argument that when the stomach was low down, as in Dr. Woolsey's case, the anterior operation was easier than the posterior one. On the contrary, he thought that the pendulous stomach could more readily be lifted out of the abdominal cavity, and this would facilitate the posterior operation. The speaker said that he had formerly done the anterior operation many times, but during the past six or eight years had abandoned it entirely in favor of the posterior method. Others had come to the same conclusion, notably Czerny. Others again, for example Mikulicz and Mayo, had found that results equally as good could be obtained by the anterior operation. For some reason or other, this had certainly not been the speaker's experience, although it had always been his aim to establish the anastomosis at the most dependent point of the stomach in the anterior operation. Still, with the patient in the recumbent position, posterior gastro-enterostomy did seem to place the outlet at the lowest point. This, in the weakened condition of the muscular walls of the stomach, was perhaps of some importance.

Dr. BROWN said that in cases where the stomach was opened

anteriorly for some other purpose, such as pyloric ulcer, and the indications for a gastro-enterostomy then became apparent, he would use the anterior opening for the anastomosis rather than make a second posterior opening for that purpose. When the omentum was voluminous or heavy, he preferred to make a slit through this tunic close to the inferior margin of the transverse colon, and lead the loop of jejunum through rather than under the entire omentum.

DR. WOOLSEY said he had practised the posterior operation until he read Mayo's article on the subject. Since then he had done the anterior operation entirely, and he had never had any vicious circle in any of his cases. He had found it easier to do the anterior operation than the posterior one. In the case under discussion, the stomach hung so far down that, in order to get at its posterior surface through the mesocolon, it would have been necessary to lift up not only the omentum and transverse colon, but also the stomach, which hung down over the latter, and to do this a much larger incision would have been required. According to Mayo's statistics, which are the largest of any operator in this country, the results, both as to mortality and function, are quite as favorable for the anterior method as for the posterior, if not more so. The anterior operation was also simpler and easier than the posterior, and Dr. Woolsey said he saw no reason why the button should not pass as readily by one method as by the other, for, if the operation is properly done, the button is at the bottom of a funnel-shaped protrusion at the most dependent part of the stomach.

GANGRENOUS PANCREATITIS, WITH EXTENSIVE RETRO-PERITONEAL NECROSIS.

DR. F. TILDEN BROWN presented a woman, thirty-four years of age, who was admitted to the medical service of the Presbyterian Hospital on August 18, 1902. Some two years before she had received a blow on the left margin of the epigastrium from the edge of an iron sauce-pan. This was severe enough to require her being carried to her rooms, and a miscarriage occurred shortly after. Although in fairly good health for the next two years, she had all this time moderate epigastric pain. After any exertion, distress in the region of the blow was always noted. In June last, two months before entering hospital, she sat on wet ground to

nurse her two months' old baby. On reaching home from this day's outing in the country, she had a sudden and severe attack of epigastric pain, with vomiting at frequent intervals; the abdomen became distended, and there was total anuria for forty-eight hours. Pain was severe, knife-like, and continuous, but varied in severity. On the second day she became delirious, feverish, and had one or two chills. Normal urination gradually returned, but constipation became very troublesome. Pain and delirium abated, although patient continued to be weak and feverish.

She was in bed for most of two months. On admission to hospital, her temperature was 102.6° F.; pulse, 120; respiration, 25. Abdomen was distended; tympanitic over all except in the flanks, where there was some dulness, not shifting with the position of the patient, and a sense of doughy resistance extending from the retrocostal margin into the pelvic brim. A similar mass was felt in the epigastrium. The urine showed no sugar; there was a trace of albumen.

During stay on medical side her temperature ranged irregularly between 101° and 104.6° F., with mild, chilly sensation; sweating and marked prostration. Constipation was very extreme, needing internal catharsis, and bowels moving only with large enemata. Distention increased and the patient grew progressively weaker. Dr. Brown saw her on August 30, and, without making a diagnosis, advocated exploratory laparotomy.

Under chloroform, a median epigastric incision showed normal peritoneum and omentum. Drawing the latter out of the wound and lifting the transverse colon, a short loop of small intestine was noted adherent to the transverse mesocolon to left of the median line; detaching this by traction and the twisting motion of a sponge in long forceps, a drop or two of thin pus was seen to exude from the surface of the mesocolon. Covering this defect with the same sponge, the patient was turned slightly to expose the left loin, where a lumbar retroperitoneal incision opened into a large abscess cavity, from which a quart or more of very foul, stinking, thin brownish pus was evacuated, together with a number of large white shreddy masses of greasy consistency. Some of this material was lying unattached in the retroperitoneal iliac fossa and was removed with long forceps. The cavity was irrigated and provided with several large, long rubber drainage tubes lightly held in place with sterile gauze. The anterior incision was

closed in layers, except for a small cigarette drain to the site of the small perforation. Although in bad condition, the patient responded to stimulation. For the following week or more the pre-existing constipation disappeared. Temperature ran from 102° to 105° F. for a few days, and then gradually fell until some two weeks later, when it began to rise again, and the patient's general condition, which had greatly improved, showed deterioration. The left lumbar wound was draining freely, and several more necrotic masses of large size had come away. The pathologist recognized in some of these pancreatic tissue.

The doughy fulness in the right loin seemed again to be more manifest, especially low down, and on September 27 an incision was made in the right loin opening into an abscess, the contents of which were exactly the same as those found on the opposite side, while somewhat less in quantity. Much of the retroperitoneal areolar tissue seemed to have been detached and converted into necrotic greasy masses. The psoas muscle and part of the quadratus lumborum stood out without surrounding attachments.

After this the patient very slowly but steadily improved and gained strength. The wounds drained freely, extensive sinuses, six to eight inches deep, remained for several months. There was considerable passive congestion of the lungs for the first eight or ten weeks. At one time there was consolidation at the left base as far as the angle of the scapula, and temperature reached 104.3° F.; but she gradually rallied, and convalescence continued until her discharge on January 5, 1903.

At no time was there any sugar in the urine or fat in the stools.

The highest leucocyte count was 14,000, two days before the second operation. The abdominal wound is firm. That in the right flank is still discharging slightly. She has gained about thirty-five pounds, and now weighs 130 pounds. No growths resulted from cultures made at time of operation. She formerly weighed nearly 200 pounds.

The surgical aspects of this case would induce the speaker to urge the importance of retroperitoneal access and drainage, not alone in such cases as the present, where intraperitoneal rupture was just about to occur, but in those where this has already happened, involving either the greater or lesser cavities, and particularly if the surgeon, on opening the abdomen, finds evidence

pointing to an earlier localization of peripancreatic suppuration on the other side of the peritoneum.

While in such a case of rupture attention must be given to the immediate management of the intraperitoneal complication, simultaneous provision for subsequent lumbar diversion of the drainage will tend to avoid the greater absorptive risks, as well as the many compromises, such as hernia and intestinal adhesions, incidental to long-continued transperitoneal drainage.

DR. WOOLSEY said that he had seen the patient previous to the operation, and in the history she gave, the most important point brought out apparently was that she had sat on wet ground during a day's outing in the country, and that this exposure was followed by a sudden and severe attack of epigastric pain. There was a good deal of distention, and in the left flank a sense of resistance, which seemed to extend in the shape of a pedicle towards the median line. This, together with the history of anuria, seemed to point to the kidney as the source of the trouble. The speaker said he did not have the slightest idea that the case was one of pancreatitis. Everything pointed to the kidney.

EXCISION OF PATELLA IN EXTENSIVE WOUND OF KNEE.

DR. W. G. LE BOUTILLIER presented a man, thirty years old, who, on October 27, 1902, was struck by a falling rock in the subway, receiving an extensive lacerated wound of the right knee-joint. He was removed to hospital, and after cutting away the lacerated shreds of tissue it was found that a large part of the capsule of the joint over the external condyle was entirely missing. There was a transverse fracture of the patella, and both fragments of the bone were lacerated to such an extent that they were removed. There was practically no reaction after the operation. On the nineteenth day, skin-grafts were applied to the extensive raw surface. Motion of the limb is still much restricted, although he is able to extend it very well and flex it slightly. In reply to a question, Dr. Le Boutillier said that extension was now brought about by the vastus internus. The skin-grafts were applied directly to the granulations, and the restriction of motion was probably at least partly due to adhesions of the cicatrix to the condyles of the femur.

RESECTION OF INTESTINE FOR STRANGULATION BY A BAND.

DR. BENJAMIN T. TILTON presented a man, fifty years of age, who had always enjoyed good health until the 30th of September, 1902. On that date he felt a sudden sharp pain in the abdomen, and soon afterwards began to vomit. The pain gradually increased in severity and the vomiting continued. The following morning he was brought to the hospital, and when Dr. Tilton saw him at eleven o'clock in the morning, about twenty-four hours had elapsed since the onset of his symptoms. At this time the patient's temperature was 101° F.; pulse, 120. The entire abdomen was extremely tender and tympanitic on percussion. A tumor was made out just beneath the umbilicus.

Upon opening the abdomen, a coil of blackened intestine was found, which proved to be the lower end of the ileum. It was tightly constricted by a band running across the mesentery, and when this constriction was relieved, the color of the bowel did not improve. About twenty-five inches of the small intestine, terminating below at the cæcum, were resected, and the divided ends brought together over a Murphy button. The mesentery was found to be so much congested that a large part of it had to be removed to prevent sloughing. The abdomen was closed with a small drain, and the patient made an uneventful recovery from the operation. The button was passed on the twenty-first day. Since the operation, the patient had gained ten pounds in weight.

Dr. Tilton said he had no idea what caused the adhesive band to form. The patient gave no previous history of appendicitis or other intra-abdominal trouble. The speaker said that in three cases of this kind upon which he had operated, he had inserted a gauze drain down to the seat of anastomosis, and he had never seen a fæcal fistula result.

BULLET IN BRAIN.

DR. B. FARQUHAR CURTIS presented a patient whose case Dr. Curtis had reported at a meeting of the Society two months previous. The man was shot in the back of the head. For two months after receipt of the injury he was delirious. The bullet punctured the longitudinal sinus and produced a right-sided hemianopsia, which still inconveniences the patient to some extent.

Otherwise, he had entirely recovered. Two skiagraphs were taken by different men, both experienced operators, and both pictures agreed as to the position of the bullet in the brain. An exploratory operation was done to remove the bullet, but this proved unsuccessful. It is still embedded in the brain, and apparently gives the patient no trouble.

DISTENTION OF THE MAXILLARY ANTRUM.

DR. CHARLES H. PECK presented a woman, nineteen years of age, who was admitted to the French Hospital, February 18, 1903, presenting a marked bony prominence on anterior aspect of right superior maxilla, of three weeks' duration, without pain, tenderness, or other symptoms except the facial deformity produced by the mass, which was about the size of half an English walnut. No evidence of pressure on nasal fossa, orbit, or palatine plate. The day before admission, the second bicuspid tooth was withdrawn by a dentist; patient stating that no fluid escaped at the time.

February 21 the patient was etherized, and an incision made over the mass at the reflection of the mucous membrane from cheek to gum, and carried immediately through an extremely thin shell of bone, which crackled like an egg-shell on pressure, into the antrum. The opening was enlarged and the finger inserted; the cavity was empty, no fluid escaping; the mucous membrane appeared normal, both to the touch and appearance by reflected light; there was no bulging nor deformity of orbital, nasal, or palatine walls, but the orbital plate had the egg-shell crackle on pressure. A director passed easily from middle meatus into the antrum, and also through the tooth socket of second bicuspid.

The entire anterior bony wall was as thin as paper, but the bone seemed normal in consistence. The surrounding soft parts seemed perfectly normal.

The incision was closed by suture, and drainage established through tooth socket.

DR. HAWKES thought the case reported by Dr. Peck was one of bone cyst, with as yet incomplete absorption of the bone. It was very similar to the case he had shown, but the process here had apparently not advanced so far. The contents had probably escaped very gradually through the opening made by removing the tooth.

DR. PECK said he was inclined to accept Dr. Hawkes's explanation of the bulging as the correct one. As regards the appearance of the bone, it was very thin, but apparently just as firm as normal bone. The tissues attached to the bone appeared to be perfectly normal, and nothing in their appearance suggested a tumor. The speaker said he regarded it as a case of distention of the maxillary antrum from pressure of some sort within the antrum.

HÆMORRHAGE FROM BULLET WOUND OF RENAL VESSELS.

DR. F. TILDEN BROWN said that wounds of this nature were rare enough to induce him to present a woman, thirty-six years old, who was brought to his service in the Presbyterian Hospital July 14, 1900, about two hours after receiving two penetrating wounds from a .38-caliber pistol at about fifteen feet range. She was shot in the back when descending a short flight of stairs. On admission the patient manifested some degree of shock; pulse was very small and feeble; breathing rapid; but patient was not exsanguinated, and there was no bleeding from the mouth. Posteriorly, on the right side, respiratory sounds were poor; there were no râles.

On the right scapula, just below the middle of its spine, was one wound of entrance, one-third of an inch in diameter, and below the right twelfth rib, three inches from the vertebral spinous process, was a similar bullet wound of entrance. No wound of exit could be found.

The patient's abdomen was held very rigid. From the ensiform cartilage to a point two inches below the umbilicus and to the right there was flat percussion. An immediate operation was made under chloroform changed to ether anæsthesia. Below the right costal margin a vertical incision was made; on parting the fibres of the right rectus, it happened to expose in part the track of one bullet in this muscle, but its course in the parietes was not pursued; it had evidently not re-entered the abdomen. Several moderate-sized blood-clots were found in the concavity of the right lobe of the liver, derived apparently from a superficial wound of the inferior margin of this organ. No other wound of the intraperitoneal viscera was found, but a large retroperitoneal hæmatoma had been recognized on opening the abdomen. With

hasty closure of the first incision, the patient was turned for surgical exposure of the right lumbar retroperitoneal space. On reaching the kidney, hæmorrhage was profuse, and was found to come from one or more renal veins or some large vein in close apposition. The bleeding was controlled by three clamps, which were left *in situ* on the posterior aspect of the kidney and its pedicle. A light packing of sterile gauze encased the clamps, and the wound closed with chromic gut, except at the upper angle. During the latter part of operation, the patient had 1200 cubic centimetres intravenous saline infusion. The patient's pulse was imperceptible on return to ward, but responded to vigorous stimulation and large hot saline enemata. For two days shock was marked and the pulse very small; on the third day, moderate general improvement. The clamps were now removed, and the bowels moved by a cathartic; on the fifth day patient was hungry and generously fed. Both wounds healed satisfactorily. On the fifteenth day, signs of fluid in the right chest having appeared, ten ounces of dark-brown fluid were removed by aspiration; five days later a somewhat smaller quantity was obtained. The temperature on admission was 100° F.; respiration, 36. On the third day, temperature was 103° F.; pulse, 120. For twelve days the temperature ranged between 101° and 103° F.; pulse, 120 to 96. The highest temperature, 104° F., was just previous to the first aspiration, after which it gradually fell to normal.

The urine on admission was acid; specific gravity, 1024; heavy trace of albumen and a few granular casts. The day following operation, specific gravity 1022; albumen; red blood-cells abundant. Five days later, specific gravity 1014; neutral; trace of albumen; few leucocytes.

Three months after being shot, patient presented with a bullet bulging beneath the skin at the umbilicus. A radiograph made by Dr. H. B. Johnson, one month later, showed the remaining bullet at the inner margin of the right scapula. Repeated physical examination since showed nothing abnormal in the right chest.

PIN IN THE ABDOMINAL CAVITY.

DR. WOOLSEY said that on December 25 last he operated on a woman who had been referred to him with the diagnosis of ovarian cyst. Upon examination, he was unable to find any evi-

dences of such a cyst, but on the right side of the pelvis there was a hard, painful mass. Upon opening the abdomen in the median line, he found several coils of small intestine which were very adherent to a mass in the right half of the pelvis. The cæcum was drawn down over the brim of the pelvis. After freeing the adherent intestines, he found an abscess, and upon opening this and introducing the finger he felt a hard body, which proved to be an ordinary pin, very much encrusted with a blackish material. In front and to the right of the abscess, and forming a part of its wall, was the appendix, which was removed; it was much enlarged, and its walls thickened and chronically inflamed. The wound was closed, with drainage, and the patient made an uneventful recovery. This woman had long been in the habit of putting pins into her mouth. This one had probably found its way into the abdominal cavity through the appendix, carrying infection with it.

NEEDLE AND THREAD REMOVED FROM AN ABSCESS UNDER THE LIVER.

DR. HAWKES reported the case of an Italian laborer who was admitted to the Presbyterian Hospital with the history that one month previous, after sewing a button on his vest, he had left the needle sticking in his tie. Soon afterwards he had a fight with a fellow-laborer, who struck him in the epigastrium. The blow gave rise to a sharp, pricking sensation, and he noticed a day or so later a small scratch on the abdomen. Two weeks later he developed symptoms of intra-abdominal trouble, and an operation revealed an abscess just under the liver, which contained about a pint and one-half of greenish pus, together with a needle and a piece of black thread.

TACK IN THE APPENDIX.

DR. CHARLES H. PECK said that last summer he operated upon a patient for appendicitis. The history was that for five years back the patient had suffered from several severe attacks, with colicky pains, but no inflammatory symptoms; the operation was an interval one. The appendix was found to be unusually large and long, but not inflamed. Upon opening it, a sharp, rather long upholstery tack was found, with two small concretions distal to it. It had evidently been there a long time without giving rise to any inflammatory trouble.

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, March 2, 1903.

The President, RICHARD H. HARTE, M.D., in the Chair.

PAPILLOMA OF THE VULVA IN A CHILD.

DR. GEORGE ERETY SHOEMAKER reported the case of a girl, aged six, who was seen with her physician because of a bleeding growth protruding from the vagina, accompanied by a persistent irritating discharge. The general health of the child had been impaired for a year, and adenoids of the nasopharynx had been recently removed by another surgeon. About eight months before a white vaginal discharge had appeared, and had since resisted treatment at the hands of various physicians. Bleeding had appeared six weeks before his visit, but the growth had been noted only for a few days, and had increased decidedly.

Examination showed several soft, easily bleeding, prominent papillomatous masses occluding the vulvar cleft. There was no involvement of the skin surfaces, or of the anus. The masses were pale pink in color, sharply elevated, pedunculated, and quite fragile, while some were flattened from side to side and serrated on top like the comb of a cock. One rounded portion half an inch in diameter sprang from within the urethra by a stem. Smaller growths sprang from pits beside the urethra, while inside the posterior commissure the bases of others, which were large and irregular, were attached. None appeared higher in the vagina. The discharge showed diplococci within the cells of typical gonorrhœal character.

After twisting off the growths, their bases were burned with the thermocautery, the one springing from the urethra being, however, tied off to avoid contraction. Protargol solution was

ordered for the discharge. Recovery was prompt. The reporter added that these vascular tumors of the urethra were said by Pozzi to occur in poorly nourished children, and to be due to irritating discharges. They are more common in the adult. It is not thought necessary by some authors to consider them venereal in origin, though they are apt to accompany gonorrhœal or syphilitic disease. Two varieties are described, the flat condylomata which are of syphilitic origin and frequently spread over the perineum and about the anus. The acuminate variety assumes a more typical papillomatous form and is the variety seen in this case.

The theory that they may occur independent of gonorrhœa is quite doubtful. Gynæcologists who have had occasion to make systematic microscopical tests of apparently innocent vaginal discharges have been many times impressed with the impossibility of excluding gonorrhœa by the macroscopical appearance of the surfaces involved or of the discharge; and if they were subjected to careful search, it is probable that all cases would show the gonococcus at some period of their history.

Boldt says (Keating and Coe, "Clinical Gynæcology," page 528) of these condylomata that observation has shown their occurrence even in children, though bacteriologists have not yet succeeded in proving the presence of gonococci in pointed condylomata. This case would seem to prove the presence of this exciting cause. Dr. J. Dutton Steele, of the Pathological Laboratory of the Presbyterian Hospital, kindly examined the growths and pronounced them papillomata with round-cell infiltration at some points.

The child was remarkably submissive to free exposure and examination, which suggested the possibility that she had been accustomed to handling, and that gonorrhœal infection might not have been accidental.

THE DRAINAGE OF THE CHEST IN EMPYEMA WITHOUT THE USE OF TUBES.

DR. LEON BRINKMAN read a paper on the above subject.

After reviewing the state of present knowledge and practice in cases of empyema of the thorax, he continued with a description of a method whereby immediate adequate drainage could be secured without the use of drainage tubes.

He said that the operation advocated by Estlander, while a distinct advance in the treatment of empyema, is a very extensive one, and does not present any advantage over the method described below. Among twenty-seven cases in which it had been applied by him there were several in which, had it not been adopted, he would have been compelled to do the Estlander operation, entailing as it does a greater amount of manipulation, destruction of tissue, and a great mortality.

Dr. Carl Beck had devised a method somewhat similar to the one advocated by the author, differing, however, in several vital points. He was not aware of the operation advocated by Beck until in September, 1902, when it was brought to his notice by Dr. Gibbon, of Scranton. He had since gone over the literature carefully, and had found that Dr. Beck had reported his experience with suture of the pleura to the skin as early as 1894; he, however, introduced a drainage tube after three days to avoid hæmorrhage.

The operation recommended by Beck consists in making an incision over the seventh rib, parallel to the rib, reflecting back the superficial structures, denuding the rib of its periosteum, introducing a special scissors beneath the rib, which also served the purpose of a periosteal elevator, and excising four inches of the rib.

The great point of difference between the operation advocated by Beck and the one he was about to describe is, that in the latter additional facility is afforded to manipulate within the chest cavity; that with each inspiratory movement of the chest wall a wider range of lung expansion is possible; a freer inspection of the chest cavity is permitted, making it easy to avoid the formation of pockets and doing away with the necessity for packing the chest cavity.

His own operation for immediate drainage of the chest for empyema is performed after the following manner. The patient having been prepared, a vertical incision is made in the mid-axillary line down to and exposing the fifth, sixth, and seventh ribs, more if necessary. The skin, superficial fascia, and muscles are dissected back on either side of the wound, so as to expose at least two inches of the ribs; the periosteum is freed from the anterior surface of the ribs, to permit the introduction of the periosteal elevator beneath the ribs. An elevator is then carefully

introduced beneath each rib successively, denuding them of their periosteum and underlying structures. The ribs are divided; the pleura is protected from injury by a special elevator, which performs a twofold function,—elevation and fixation of the ribs,—so as to facilitate division of the ribs with bone-cutting forceps.

The pleura having been exposed, a small vertical incision is made in it at the lower angle of the wound, at about the middle of the space, to permit the more gradual escape of the purulent secretion. Upon the complete evacuation of the purulent contents, the incision in the pleura is continued upward until it reaches the upper angle of the wound.

A free inspection of the interior of the chest cavity is now possible by retraction of the wound; if the lung is found fixed and collapsed in the upper portion of the cavity, an attempt should be gently made to separate the adhesions; if these are too firm to permit this, then they must be incised and blunt dissection resorted to, avoiding unnecessary force, which might produce extensive laceration of the lung tissue.

When the condition within the chest cavity is complicated by encysted pockets of pus, either interlobular or between the lung and the posterior chest wall, it may be necessary to go as high as the third rib in the excision.

The operation is completed by stitching the pleura and the skin together around the entire wound, thus offering a large, free opening for the escape of the succeeding secretion. In order to avoid injury to the diaphragm, all incisions are made with this organ in view.

A serous membrane like the pleura, which under normal circumstances has great absorptive powers, is capable of taking up a toxic amount of drug from any fluid thrown into the chest cavity which would contain a sufficiently strong antiseptic to alter the character of the pus. Although the character of the membrane is altered by the inflammatory process, still it is capable of absorption.

In commenting upon the practice of irrigation of the chest cavity, the dangers of this procedure should be well borne in mind; fatal syncope and hemiplegia are prominent among these. From experience, he had found that irrigation of the chest cavity does not diminish the amount of discharge, but rather, on the other hand, favors an increase.

The periosteum must be carefully dissected away, otherwise, during the process of repair and closure of the wound, pain-creating masses of fibrous and calcareous tissues are formed.

During the past five and a half years he had spent considerable time and thought in perfecting the detail of the immediate method of drainage without tubes, and had had an opportunity to compare it with excision and tubular drainage. The total number of cases operated upon for empyema was forty-seven, twenty of which were by excision and tubular drainage, the remaining twenty-seven were by the immediate type of drainage, stitching the pleura to the skin. The results in the latter method had been so conclusive that he believed the benefits from it were unquestionable. Of the twenty-seven cases treated by this method of drainage but two had had a protracted convalescence, and these would have occurred under any method employed. The first was a young girl with a tubercular empyema complicated by extensive tubercular involvement of the base of the right lung. It is now two years since she was operated upon. Her condition at the present time is as follows. A small discharging sinus is seen at about the middle of the scar of the former operation, from which a slight amount of semipurulent material makes its escape. Microscopical examination of the discharge from the sinus and of the sputum fail to reveal tubercle bacilli. Her general condition has improved in the past four months to a remarkable degree, her weight having increased thirty pounds. The area of lung involvement in the impaired lung has decreased to one-half its former dimensions.

The other case occurred likewise in a young female. The empyema was a secondary complication to pneumonia. In addition to the empyema, there was a localized patch of gangrene in the anterior pleural surface of the lung, which upon separation developed into a bronchial fistula. With the gradual decrease in the size of the wound, there has been a perceptible decrease in the amount of discharge and of the air making its escape through the sinus. At the present time there is scarcely any discharge, and air can only be forced through the sinus when the breath is held and forcible compression of the chest wall made. It is now seven months and two weeks since she was operated upon.

The remaining twenty-five cases by this method have all done well, the shortest time for a cure to be established was three weeks and the longest five months.

It will be found necessary in some cases to freshen the edges of the wound and bring them together with sutures, so as to hasten the closure. This was done in five of the twenty-seven cases, the discharge having ceased after three weeks.

DR. HENRY R. WHARTON said that he had found simple incision with the insertion of tubular drainage very satisfactory, especially in cases of empyema in children, though in later years he has often excised a rib. He rarely excises more than one rib, and only from one to two inches are removed. The success of these operations in children depends on the elasticity of the chest wall. Preliminary aspiration is wise in many cases, this being done some hours or even days before the radical operation. He has never practised the operation recommended by Dr. Brinkman, but thinks the only objection to the operation is the time required, for time is a very important element in operations for empyema in children. The danger from irrigation in these cases is very great, and it should not be employed. Decortication of the lung, recommended by Fowler in the case of adults, is theoretically a very good method; but hæmorrhage is apt to be profuse, and the time consumed is necessarily so great as to make the operation dangerous. Resection of ribs and tubular drainage, or stitching the pleura to the skin if that is preferred, are probably the best operations that can be done for the patient. It is a mistake to drain without having broken up adhesions. The incision should be made large enough to allow search for and breaking of adhesions, as prolonged suppuration is often due to their presence.

DR. JOHN H. GIBBON said that the operation recommended by Dr. Brinkman appealed to him, and had in it many points to be commended. In one class of cases, however, he does not think it practicable, namely, the acute empyemas of children. These cases he believes will do as well with tubular drainage as when operated on by the method advocated by Dr. Brinkman. In adults, and where the condition is not so acute, the latter method is no doubt a good one. Dr. Gibbon briefly reported two cases. The first was that of acute empyema in a child of twelve months, which he thinks is an unusually early age for that affection. The child had been extremely ill from pneumonia for a number of weeks. Prior to operation, which consisted of simple incision with tubular drainage, six ounces of pus were aspirated from the pleural cavity. The child was well in six weeks. The second

case was one of sudden death in a child during the application of a dressing three weeks after operation. This case was reported because we generally hear of sudden death in these cases as being due to irrigation. In this instance irrigation had never been employed. The case was one of double empyema, operation upon which illustrated very well the advantage of chloroform anæsthesia and the necessity for rapid operation. Resection of one rib on each side and the opening of an abscess of the shoulder were performed in eleven minutes. The child was taken from the hospital against advice, but was dressed at home by a competent physician. Three weeks after operation the child was turned from one side to the other while being dressed, and died at once. In reply to Dr. Gibbon's question as to age incidence of empyema at the Children's Hospital, Dr. Wharton said that the youngest patient he remembered operating upon was eighteen months of age. The child did perfectly well under simple incision and tubular drainage. Empyema is certainly unusual in children under one year of age.

DR. RICHARD H. HARTE said that as to technique he was convinced that there is nothing better than the straight, mid-axillary incision, provided it gives perfect access to the cavity. Time is of the greatest importance in these operations. With care two or more ribs can be rapidly exposed and a suitable director passed underneath them separating the costal pleura. Then by introducing a heavy pair of bone forceps a section of the ribs can be readily cut and removed, and it is rarely necessary to apply any sutures to the bleeding vessels. The patient can then be turned over on the side, the costal pleura broken through, and the chest contents drained, thus avoiding all the annoyance of air being drawn into the pleura and the unnecessary soiling of the patient by the escaping pus. The greatest care should be taken after the pus has escaped that all masses of fibrin are carefully removed from the pleural cavity with a suitable pair of forceps, since, if masses of fibrin are left, great annoyance will be occasioned by the blocking up and occluding of the drainage tube. This drainage tube should be double and of as large a size as can be obtained. It is advisable to use two tubes side by side, and retain them in position by the suture which is used for closing the skin wound. Care should be taken that the ends are not allowed to irritate the lung, and therefore the tubes should be

used either just passing through the costal pleura or else sufficiently long to drain over and pass down deeply into the pleural cavity, thus avoiding the ends of the tubes coming in contact with the lungs, which is always a source of irritation and discomfort to the patient. In Dr. Harte's experience nearly all cases of empyema heal in a comparatively short time, provided the cases are seen early and before the lung has an opportunity to become tied down by old adhesions, which prevent its expanding and close the pleural space.

DR. BRINKMAN, in rejoinder, said that Dr. Wharton's method would suffice for acute empyema in children. His experience has been mainly with late cases, in which his own method is more applicable. By this method, adhesions, especially those between the lobes, can be easily separated, and the lung allowed to expand, which is the secret of success in these cases. Patients will get well if only a simple incision be made, but the method described facilitates recovery. The operation can be done in from fifteen to eighteen minutes. He thinks the death reported by Dr. Gibbon was due to shock or to an embolus in the brain. Shock is now recognized as the cause of deaths which occur during irrigation. The writer knows of no deaths from chloroform, but has heard of one resulting from struggles during etherization. The straight incision is undoubtedly the best. If it is carried below the seventh rib, the diaphragm is apt to be injured, but the finger can be carried down much farther. Dr. Brinkman has seen one case where the patient wore a silver tube in his side for fifteen years. Removal of the tube was followed in a week by healing of the cavity.

THE TREATMENT OF EXOPHTHALMIC GOITRE.

DR. JOHN B. DEEVER read a paper on this subject, reporting a case of bilateral removal of the entire cervical sympathetic, *i.e.*, the cords and their ganglia, for which see July ANNALS OF SURGERY.

MYOSITIS OSSIFICANS TRAUMATICA.

DR. WILLIAM J. TAYLOR read a paper with the above title, for which see page 825.

DR. JAMES K. YOUNG reported a case of myositis ossificans that occurred in a man aged fifty. The rectus of the quadriceps

extensor was the muscle involved, the exciting cause being the kick of a horse. The resulting mass was two and one-half inches wide and one inch thick. It was movable and very dense.

DR. WILLIAM J. TAYLOR said he wished to modify slightly the statement in his paper that the patient had had no trouble since. One year after the operation, a horse ridden by the man fell, and threw him in such a way that a root ran into the old operation scar. This was followed for a time by the discharge of inflammatory material and dark-colored blood, but the wound afterwards healed entirely and has given no trouble since.

DR. W. M. L. COPLIN, who had reported the histological findings in the tissue removed by Dr. Taylor, spoke of the difficulty experienced by pathologists in making diagnoses from very small fragments of tissue, as in the case under discussion. The tissue in question contained masses of marrow cells in a cellular matrix, altogether resembling the cell picture of myeloid sarcoma. The suspicion of myositis ossificans was first aroused by finding newly-formed bone along the degenerating muscle-bundles. Ossifying myositis has been classified as idiomatic or traumatic, and disseminated or local. Regarding the origin of the condition, there is some question as to its inflammatory nature. It is held by some writers to be a dystrophy, thus belonging to the group of diseases including pseudohypertrophic muscular paralysis. This view, however, is not generally accepted. The fact that traumatism is frequently a cause, the presence of lymphoid infiltration and the formation of new fibrous tissue point to the inflammatory nature of the process. It has been thought that it might depend upon the presence of congenital or acquired ectopia of osteogenetic tissue which is stimulated to growth by irritation; the view that the bony change originates in a congenital defect in the involved parts is an adaptation of this theory. Regarding the condition as one that is essentially inflammatory in nature, places it in close relation to the ossifying inflammations of tendon sheaths and glands. Still another view is that myositis ossificans is essentially neoplastic in nature, and thus comparable to cases of multiple osteomata in the lungs, glands, etc. The many suggestions offered prove that the origin of the change is yet unknown. That it is infectious in character has even been suggested. In a reported case of gonorrhoeal myositis and in a case of staphylococcus infection, similar but not identical changes have been recorded. It is not uncommon

to find near tuberculous foci osteoid or chondroid or, perhaps better, cretaceous areas that may resemble bone. In closing, Dr. Coplin emphasized the possible difficulty in differentiating ossifying myositis from myeloid sarcoma, especially in tissue from the region of the jaw. This difficulty is particularly marked when the specimen consists of only fragments of tissue.

CAPTAIN CHARLES F. KEIFFER, U. S. A., stated that he had excised a bony fragment from the deltoid muscle of a cavalryman who had first noticed the condition ten years before. The fragment was true bone and had reached the size of a half-dollar. In looking up the literature, he had found that in the times of Gustavus Adolphus and Frederick the Great the soldiers were troubled with what they called sesamoid bones in the deltoid muscles. Their formation was attributed to the irritation and pressure of the guns carried by the soldiers. This cause was probably active in the case of the cavalryman, whose gun was slung in such a manner as to jog against the deltoid.

DR. WILLIAM G. SPILLER, who made a histologic study of the tissue removed by Dr. Keen, said that the large size of the nerve, of which a piece had been removed, was owing to connective-tissue proliferation. The removal of the segment may have been of advantage, as benefit has at times followed a similar operation, inasmuch as the ends brought together contain more nearly normal nerve tissue than the portion removed.

TRANSACTIONS
OF THE
CHICAGO SURGICAL SOCIETY.

Stated Meeting, March 2, 1903.

MALCOLM L. HARRIS, M.D., in the Chair.

REMOVAL OF BIRTH-MARKS.

DR. L. L. McARTHUR presented a young woman whom he had recently subjected to a new procedure for the obliteration of an extensive superficial vascular naevus of the forehead, eyelid, and cheek.

The red color of these marks being due to capillary dilatation, it was necessary to obliterate the capillaries. In order to do this, he conceived the idea that if on a plane horizontal to the surface upon which this red area rested a section was made of the integument in such a way that the entire thickness of the integument should not be destroyed, but that the knife should pass through each capillary loop as it came to the surface, he would then still have integument enough intact to prevent actual perforation of the same, with protection of the connective tissue beneath. If, after waiting for coagulation of the blood in these cut capillaries, a thin Thiersch graft should be applied, all of these cut capillaries would then be obliterated, being plugged with blood-clot, and the graft, becoming organized, would destroy the pigmented appearance of such a mark.

Eighteen months ago the young woman presented herself with a very pronounced mark that extended over forehead from the scalp to the eyebrow, including the eyebrow, the upper eyelid, and a portion of the malar prominence of the cheek. He adopted the method of procedure described on a surface which had already received electrolysis and various other methods for the destruction of the vessels and color without avail, and he had succeeded so

well that he thought it worth while to exhibit the result. The scar was so soft there was a flexible eyelid. Before this treatment, the mark could be seen readily across the room, but now one had to look before noticing it.

LATE RESULT OF PYLORECTOMY FOR CARCINOMA.

DR. McARTHUR again presented a case previously exhibited to the Society. The patient was a man from whom he had removed a portion of the lesser curvature of the stomach and the anterior wall, with also a portion of the inferior surface of the left lobe of the liver, for carcinoma. He presented at that time the microscopic slides. Those slides were examined by several of the Fellows present, and pronounced, notably by Dr. Fenger, to be undoubtedly carcinomatous, as the tissue could be seen involving the liver tissue without any capsular line of demarcation between the normal liver tissue and the new growth. He presented the case first to the Society because it was a recovery from a resection of the liver and stomach wall combined, accompanied with the report furnished by the Pathological Laboratory at St. Luke's declaring it to be an adenocarcinoma. At that meeting the opinion was expressed that the man would in all probability soon succumb to a rapidly recurring carcinoma. He had not been convinced, as he recalled the cut surface of the liver from which the growth was excised. He knew that he had removed all of the stomach growth. He felt sure of it. Nevertheless, he felt rather timid as to the probability of the man living. Not only was the patient living, but was continuing to do the work he had done for years at St. Luke's Hospital, he being one of the employes there. The patient had increased in weight from 117 pounds at that time to 135 at present.

APONEUROTIC SUTURE FOR FRACTURE OF THE PATELLA.

DR. DANIEL N. EISENDRATH presented a man who had come under his care at the Cook County Hospital with a fracture of the patella. Having opened the joint for the purpose of drilling and suturing the fragments together, at the last moment he found the drill would not work; it was impossible to penetrate the bone with the drill on account of a screw in the drill having been lost, so he was compelled to suture the aponeurosis. He found the aponeurosis had been turned in at the edges of the fracture, and

the fascia, periosteum, and aponeurosis were turned in in a typical manner between the edges of the fracture. He pulled them out, brought the fractured ends closely together, and inserted four sutures of kangaroo tendon through the aponeurosis on both sides of the patella, and two sutures through the periosteum of the patella itself. The accident to the patient occurred on the 12th of November, 1902. After the operation the limb was immobilized by a plaster-of-Paris bandage. He operated the day following the injury. The incision was made transversely over the fracture. No opportunity was lost to resort to passive exercise and massage to recover function of the joint as well as possible. Six weeks after fracture, an X-ray picture showed absolutely no separation of the fragments. He exhibited the patient not only on account of the anatomical, but to show the functional result, which was perfect within seven or eight weeks after the fracture.

SURGERY OF THE KIDNEY.

DR. D. S. FAIRCHILD, of Clinton, Iowa, read a paper in which he presented some observations,—

First, in relation to trauma of the kidney not involving open wounds or wounds that have healed;

Second, in relation to suppurative nephritis;

Third, in relation to chronic degenerative disease of the kidneys.

He said that a considerable number of cases of injury to the kidney with hæmaturia had come under his observation which were not attended with open wounds or with symptoms of such severity as to require an immediate or early operation. Two of these cases he thought were entitled to special consideration. In these two cases the chief symptoms were persistent recurrent hæmorrhage and pain in the back. In one case the patient fell with his body in a doubled-up position, there was very little shock, and the hæmorrhage was never severe, but was persistently recurring on exercise. There was also a moderate amount of pus in the urine. After three months, no improvement appearing, the right kidney was explored and an irregular calculus of the size of a pigeon-egg found in the pelvis. The stone was removed, and the patient, a conductor, resumed his employment, and had continued well up to the present time. A calculus was expected on account of the pain in the region of his kidney and occasionally

in the bladder together with the pus, without definite evidence of cystitis. The calculus is believed to have existed prior to the injury and was the cause of the hæmorrhage.

In the second case the side-rod of a locomotive engine broke, came up through the cab and struck the engineer in the back in the region of the right kidney. There was some shock. Hæmorrhage appeared the next day and continued in moderate quantity for two weeks, then it became intermittent and occurred chiefly after exercise. The man became neurasthenic and lost ten pounds in weight. Six months after the accident no material improvement had occurred. There was no pus in the urine and no rise of temperature. The speaker could not determine the nature of the lesion beyond the probability of a laceration of the kidney substance which had not healed, and opened up from time to time on exertion. The long continuance of the hæmorrhage without improvement appeared to him to entitle the case to surgical interference; but on account of a dispute between the patient and the railway company as to the question of liability and damages, no proposition of a surgical character was entertained. Absolute rest for three months resulted in an almost complete disappearance of the hæmaturia. At the end of a year the hæmorrhage entirely disappeared. The latest information is to the effect that the man is suffering from a "railway spine" or traumatic neurasthenia.

He spoke next of the cases which at first present but few symptoms of serious lesion beyond the primary shock. He had observed that the degree of shock is often greatly in excess of the damage to the kidney itself. Recently he had seen a policeman who had been shot, the ball entering between the ribs on the left side and passing through the upper part of the left kidney and lodging in the left lumbar muscles. The shock was very profound for three hours, when reaction occurred; blood passed with his urine for two days, and recovery was uninterrupted.

The nature of the injury and the absence of secondary evidence of serious kidney or other damage may warrant the surgeon in withholding operative interference until further indications arise, but to assume that because the patient presents favorable symptoms on the days immediately following the reaction from the primary shock, or if no serious shock has occurred, is not entirely safe. It is true that the great majority recover, but it

sometimes happens that complications develop. If suppuration or anuria occurs, the same indications present themselves as in cases without a history of injury, and the urgency for operative treatment will be the same.

The presence of a tumor in the region of the kidney appearing after an injury is significant of some secondary involvement either of the kidney itself or the perinephritic tissue. If the disease has its origin in the kidney, it will usually be recognized by the presence of pus in the urine; but in some cases the ureter may become obstructed and the pus disappear early, leaving an uncertain and somewhat obscure history for the surgeon to base a diagnosis on; or pus may never be discovered in the urine at all on account of an early blocking of the ureter. The tumor may arise from a perinephritic hæmorrhage or an injury to the surrounding tissue with subsequent infection and suppuration. The rise of temperature and other evidence of pus formation will be of great diagnostic value in determining these conditions. The formation of aneurism of the renal artery or its branches will in a certain proportion of cases appear early, but it often appears late. There are no distinctive symptoms of this condition, and it is usually only diagnosed at the time of operation or on post-mortem examination. A tumor in the region of the kidney was found in fourteen of the nineteen cases collected by Morris, but there is nothing in the appearance of a tumor to indicate the nature of the disease. It can be distinguished from a suppuration by the absence of pus in the urine and by the absence of fever. If there is a clear history of the injury, by a careful analysis of the foregoing observation a diagnosis may be made. This is undoubtedly one of the most serious pathological lesions, and the one most liable to be overlooked in cases where pain is not present. If, however, the profession would recognize the fact that persistent kidney symptoms—especially those attended with a tumor formation, and if there is a history of an injury—are surgical affections, and treat them by operative methods, an incomplete diagnosis would not be a serious fact, for then the right thing could be done if in the hands of skilful operators.

Diffuse suppurative nephritis of the more chronic interstitial forms are not infrequently overlooked. In one case which came under his observation the condition was not discovered until the

man was examined for life insurance. He was not engaged in any active employment and no definite symptoms were complained of. In a second case a woman had been operated on for a myoma of the uterus. Ten days after the myomectomy was made the patient was taken with a chill, which was followed by a temperature of 104° F. In seeking for the cause of this complication, a microscopical examination of the urine was made and pus was discovered. A further examination revealed a swollen and tender right kidney. The temperature varied from 102° to 104° F. In two weeks the temperature subsided, and for a week the patient rapidly improved, when another chill developed, followed by a temperature of 104° F. The urine rapidly decreased in quantity, and in two days anuria developed, attended with delirium of a uræmic character. The kidney was then exposed by lumbar incision and incised freely from end to end, exposing the pelvis. The organ bled freely, no abscess was found, and no pus was apparent to the naked eye. The wound in the kidney was left open and the wound in the loin loosely packed with gauze. The patient remained in a semicomatose condition the remainder of the day; the next morning the dressings were found saturated with urine and eight ounces were passed from the bladder, from the apparently normal kidney. Temperature 100° F., and the patient much improved in mind. The amount of urine steadily increased until the normal amount was reached. From the time the first urine was passed from the bladder after the operation, no pus was found. A moderate amount of pus was found in the urine saturating the dressings. The temperature soon became normal; the wound healed slowly. She was kept in the hospital after the wound closed, and when sent home the urine was free from pus. She is now in good health. The nature of the lesion in the kidney was an interstitial nephritis. Observations of the character above referred to indicate that injuries to the kidney may be followed by secondary infection, as a later development or a primary infection without an injury may be associated with interstitial changes which may lead to a train of symptoms which may for some time escape discovery. When, finally, the diagnosis is made, operative treatment is the most certain in result. If the disease can be located in one kidney, either by physical examination or by the segregator, the kidney should be exposed and drained by incision. If both kidneys are involved, the same course

may be adopted, allowing a sufficient interval to elapse between each operation to permit the operated kidney to recover. The results where both kidneys are diseased will not be as good as in the single diseased kidney, but will certainly be better than medical treatment alone.

DR. ARTHUR DEAN BEVAN said that about six weeks ago, in Dr. Robison's service at the Presbyterian Hospital, a man presented himself with an enormous hydronephrosis of the left side. The patient was observed for some days, and then transferred to the surgical side. On examination, he found a tumor occupying the entire left half of the abdominal cavity, with the descending colon distinctly in front of the tumor, as outlined by a distinct, sausage-shaped tympanitic mass in front of the tumor. The man was passing a small amount of urine, was sweating profusely, and the quantity of urine passed from the bladder never exceeded 800 cubic centimetres in twenty-four hours in the few days while he was under observation. Under nitrous oxide gas he made a nephrotomy, opened a large hydronephrotic sac, and allowed a gallon of fluid to escape. The fluid was clear and did not contain any pus to the gross appearance. Most of the fluid escaped immediately after making the incision, as it was under considerable tension. After the operation the man passed about two ounces of urine in six hours; then there was dribbling of urine for twelve or eighteen hours afterwards, and another dribbling about twenty-four hours afterwards from the urethra. After that he did not pass a single drop of urine from the bladder. In the wet dressings from fifty to sixty ounces of fluid were found daily. The patient was watched for a number of weeks; his general condition improved so as to warrant making a radical operation, and under chloroform (second operation) Dr. Bevan exposed the hydronephrotic sac. After exposing the hydronephrotic sac, he found the ureter running along it, adherent to it, hooked over a small additional renal artery, and descending from this artery downward, there being quite a sharp flexure at the point where the additional renal artery held the ureter up. The renal artery was divided between two ligatures, and the flexure of the ureter relieved.

On opening into this hydronephrotic sac through a two-inch incision, and by turning it inside out with the finger, he found the ureter was no longer patulous. Then by means of a Heinicke-

Mikulicz operation, like a pyloroplasty, the opening between the ureter and the pelvis was enlarged. An opening was made by dividing the ureter and pelvis for three-quarters of an inch longitudinally, and uniting them by stitches. He did not hesitate to use fine silk stitches, because there was a large drainage opening, which would have to be maintained for some time, and they—the stitches—could be washed out through the large tube which was used.

The position of the renal artery was probably the cause of the hydronephrosis. The man had only one functioning kidney. He called attention to the fact that Fenger first did this operation in 1892, and was followed by four or five other operators. There were now half a dozen of these cases on record. He was convinced of the desirability of making the plastic from within rather than from without, as advocated by Fenger. He thought it was a comparatively easy procedure to make a plastic on the ureter by invaginating a part of the sac and bringing the ureter out through the opening, so that one could readily incise both ureter and sac from within, and apply stitches from within. In the Fenger operation, the entire operation was done from without, and, as in a Heinicke-Mikulicz, the stitches were applied externally.

DR. L. L. McARTHUR commented upon the case referred to by the essayist, in which all the symptoms pointed to a suppurative process in the kidney, with profound constitutional reaction, with a temperature of $103-4^{\circ}$ F., with pus found even with the segregator as coming from a definite kidney, and yet incising the kidney, but finding no pus present macroscopically observable, still to have the temperature drop, the patient improve, and all the alarming symptoms disappear, was gratifying and almost inexplicable, unless one considered these cases to belong to the group which had been classified as the interstitial mycoses of the kidney. In these there was really not a suppurative process in the kidney, but a bacterial process involving the substance proper of the kidney, as seen sometimes in the microscopic sections presented by pathologists, with the bacteria stained in the substance proper of the kidney, the process being relieved by splitting of the capsule and free drainage of the kidney. Such an experience he had recently had in a case of colon bacillus infection of the right kidney, in which a pure culture was found, in which the tempera-

ture was so high (106° F.) and the chills so severe as to warrant surgical interference for the relief of the patient, who was suffering not only from toxæmia, but from intense nephralgia. He was extremely chagrined to find no pocket of pus in the pelvis of the kidney, yet his patient improved, as did the patient of the essayist, from simple section and opening of the pelvis of the kidney, with no stone found, no collection of fluid in the kidney, the kidney engorged to more than 50 per cent. of its own normal volume.

In regard to the making of an opening in the orifice of the ureter, which has a kinking at its entrance to the kidney, or a valvular implantation, he reminded Dr. Bevan that in all of these cases of hydronephrotic or sacculated kidneys such a section could be made and the portion at fault turned into view. He had had two such cases which he had relieved, but which were not ones that had been treated by the method described by Dr. Bevan. One was a case of intermittent hydronephrosis which, at the time of operation, was entirely empty, yet showed an oblique implantation of the ureter and needed a Heinnie-Mikulicz operation for its correction. The other was a case of suppurative pyelonephrosis, with high temperature. In this case the indication was to drain the suppurating kidney and allow the toxic element in the case to subside, and later correct the process after the septic elements had been removed. In this case the kidney had again resumed its normal size and function. Urine came out at the side instead of down through the ureter. Operative intervention was necessary in this case, which could not have been done from within.

He objected to the use of a silk suture within any urinary tract, because he had had the painful experience of having had to remove a calculus which had formed around the knot of the silk which he had introduced into a suprapubic incision of bladder. Calcareous matter had deposited on that portion of the loop which finally required operative intervention. Those who have done much work on the kidney must certainly have noted the rapid deposit of phosphatic or uric acid crystals on such nuclei. In some cases, at the end of twenty-four, forty-eight, or seventy-two hours, and being situated in the ureter, they were more apt to float down the ureter or be carried down by the peristaltic wave

into it and cause trouble, than be washed out through the drainage tube.

DR. DANIEL N. EISENDRATH reported the case of a boy who fell down a flight of steps and immediately afterwards had severe hæmaturia, which lasted for three days. He did not see the boy until two weeks later, when he complained of a dragging sensation in the right side of the abdomen, where the floating kidney could be felt. In consultation with Dr. E. W. Andrews he cut down upon the kidney, and found it was displaced below the pole. The hilus of the kidney was about the level of the umbilicus, and the kidney was anchored in place; but the boy developed traumatic neurasthenia, and passed from under his observation. Here was a distinct traumatic displacement of the kidney. One could see hæmorrhages into the perirenal tissue at the time of the operation.

Another thing which the essayist called attention to, which was exceedingly important, was the relation of an injury at some long antecedent date to the development of interstitial nephritis. He recalled one case which he had had under observation, of a man who gave a history that when a child of twelve years of age he had fallen and had suffered from hæmaturia. Patient was now thirty-eight years of age. At the time he saw him he had marked interstitial nephritis, with all of the characteristic clinical symptoms of that disease.

A blood-clot, he thought, was frequently the starting-point of a calculus.

In cases of injuries of the kidneys, it was difficult to decide what to do at the time the patient was first seen; whether to wait, in extraperitoneal rupture, to see if hæmaturia continued the first day or so, provided one had not made a diagnosis, for example, of rupture into the peritoneal cavity, which latter would demand immediate operation.

THE DROWNING OF PATIENTS IN FÆCAL VOMIT DURING OPERATIONS FOR INTESTINAL OBSTRUCTION AND SEPTIC PERITONITIS.

DR. E. WYLLYS ANDREWS read a paper with the above title, for which see page 862.

PHARYNGOLARYNGECTOMY.

DR. A. E. HALSTEAD exhibited a specimen of larynx, pharynx, and tonsil which he removed last April from a man at the Chicago Polyclinic Hospital. The patient was forty-five years of age. The carcinoma started from the larynx just above the vocal cords, and involved the epiglottis, pharynx, and tonsil. The first operation was a preliminary tracheotomy, which was done because of the dyspnoea from which the patient was suffering. This preliminary tracheotomy, however, was not performed by himself. It was three weeks later before the radical operation was done. The trachea was plugged by the Trendelenburg balloon cannula, and as soon as the trachea was cut through, the cannula was removed, and an ordinary tracheotomy tube inserted. The anæsthetic was given through this, the previous tracheotomy opening having been plugged. The larynx was completely separated, together with the anterior wall of the œsophagus, the side of the pharynx, the tonsil, half of the hyoid bone, and epiglottis. A plastic operation was performed on the anterior wall of the trachea, and the wound closed. A stomach-tube was introduced, and fastened at the upper angle of the wound. The second day after operation the patient became delirious, tore out the stomach-tube, and opened up the wound. He made a very fair recovery from the operation, was up and around at the end of a week, and lived for eight months. He died from pneumonia, which was caused by exposure. After the operation, the patient became somewhat demented, frequently left the bed and wandered around at night without any clothing on him. There was no local recurrence, nor metastases found at the autopsy.

ABSCESS OF STENSON'S DUCT, WITH PLASTIC OPERATION.

DR. DANIEL N. EISENDRATH reported the case of a young woman who was referred to him by Dr. E. J. Kuh, with a diagnosis of a salivary calculus. There was a hard mass to be felt at the middle of the cheek. The first time he operated he made an incision opposite the opening of Stenson's duct within the mouth, tamponed it, and kept it in for two weeks, in the hope that healing would take place by granulation, or else he would get a new opening. At this operation he evacuated a teaspoonful of pus from what he thought at the time was a dilated Stenson's duct.

He allowed the young lady to go home, and the after-treatment was practically the same. Gauze was packed in the opening from time to time; but soon after returning to her home, the duct began to enlarge again, the inflammation returned, and she came back to him with a much larger swelling than she had before. He decided that possibly the best thing was not to go through the mouth at the origin of the opening (second upper molar tooth), but to open from the outside. He made an incision parallel to Stenson's duct, cut down upon the duct, and found it was dilated for a distance of about an inch and a half away from the parotid gland, and the opening in the mouth was completely occluded. There was a mass of pus, and the edges of the duct and its walls were gangrenous. He thought it was useless to try and drain it externally, on account of having a salivary fistula. He made an incision through which he followed up the duct to the entrance into the parotid gland, and after dissecting out about an inch and a half of it, and pressing out the secretion from the gland, which was of a yellowish character, as though pus had travelled back into the gland itself, he made a slit in the masseter muscle and pushed the duct through it at right angles to the mouth. In other words, he did a plastic operation on the duct itself, which now opened at a distance three-quarters of an inch posterior to the normal opening. He had fully expected the operation to be followed by failure, *i.e.*, salivary fistula, but he was surprised that the patient did not have one. It was now three months since the operation was performed. The wound healed in two weeks after operation.

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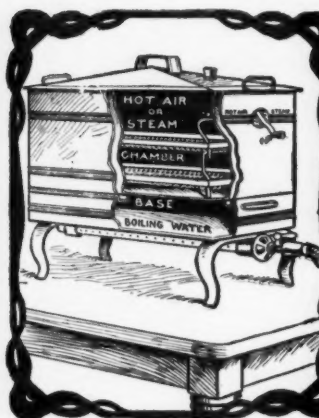
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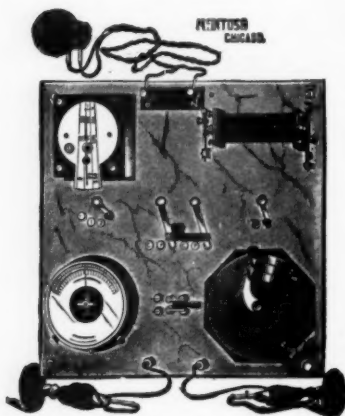
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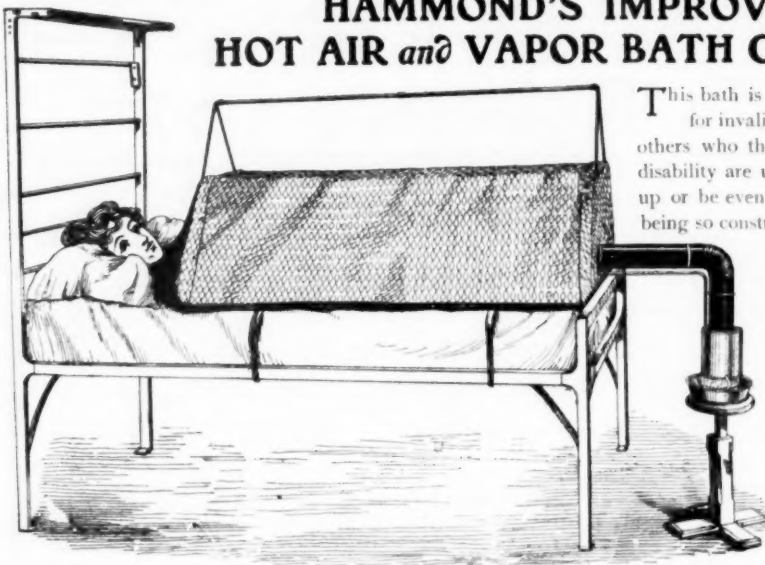
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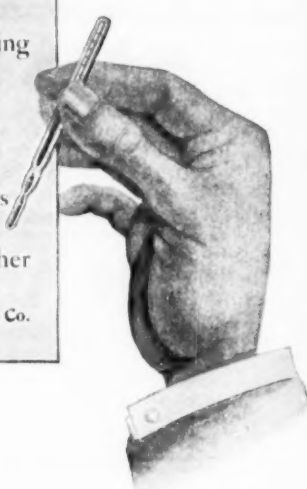
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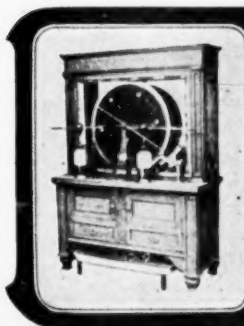
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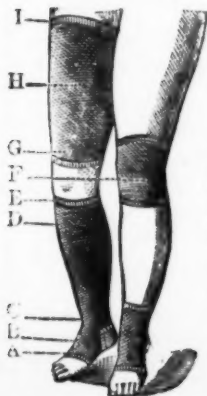


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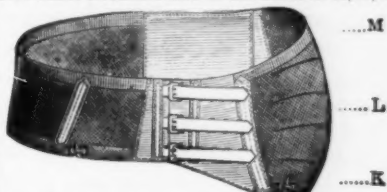
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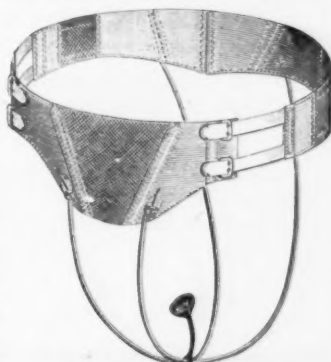
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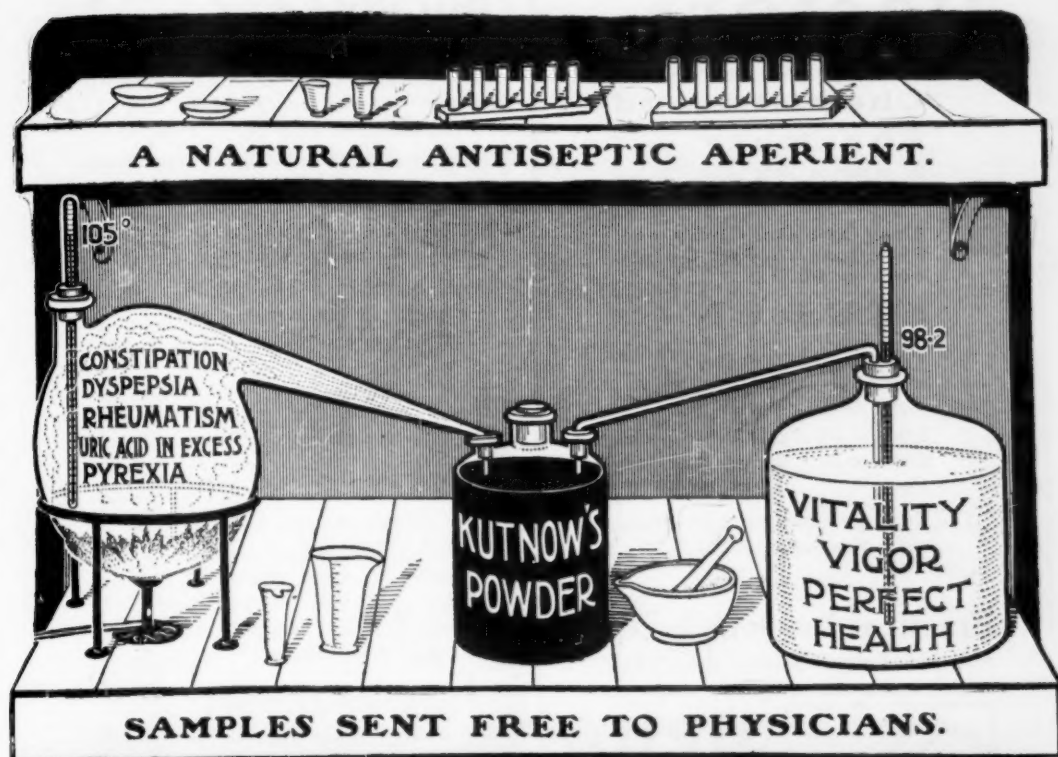
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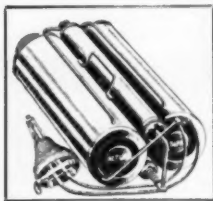
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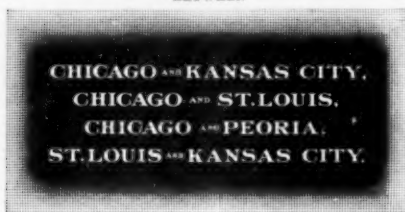
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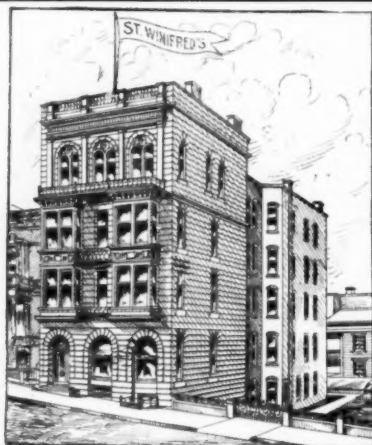


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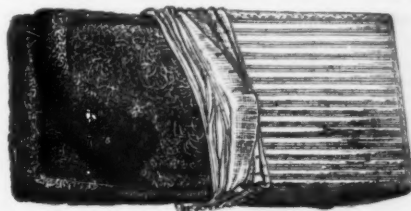
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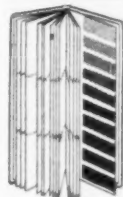
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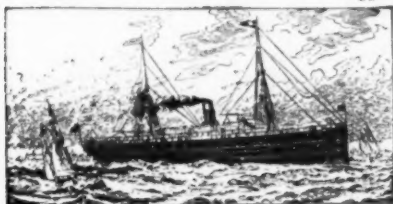
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(Abstracted from *The Alpha Omega Delta Bulletin*, March, 1903.)

Efficient measures for the treatment of surgical infections are the various silver preparations for whose introduction into surgical and obstetrical work we are indebted to Credé, of Dresden. For an effective antiseptic which is devoid of marked toxic or irritating properties Allotropic silver (Collargolum) seems to offer the nearest approach thereto. Between this silver preparation which is so bland and the silver salts like nitrate of silver, there are the lactate and citrate of silver, also introduced by Credé, of which reasonably strong solutions can be used upon quite sensitive surfaces without producing much, if any, disturbance.

First take the aqueous solution of soluble metallic silver (Collargolum), which in the strength of 1 to 500 in distilled water makes a somewhat cloudy solution. In this strength it may be used by intravenous injection in cases of severe general or puerperal sepsis, rapidly spreading gangrene, acute articular rheumatism, or other serious infections. In fact, solutions as strong as 1 to 100 may be employed; it being desirable to introduce 6 centigrammes (.9 grain) to 10 centigrammes (1½ grains) at least. If there be difficulty in injecting it into a vein, it may even be given beneath the skin. Unpleasant effects will not be noticed, neither will any immediate relief follow; but the solution thus introduced, coming into contact with the blood, which in these cases is swarming with germs, will promptly begin its bactericidal work, whose effects should be manifested after two or three hours by a fall of temperature and amelioration of septic symptoms. Silver used in this way has been of great service in cases of carbuncle and even of acute anthrax. Moreover, its administration may be repeated as often as may seem necessary.

When metallic silver is made into a suitable ointment (Unguentum Credé), which, by the way, much resembles mercurial ointment, and is then applied to the skin, there is a rapid absorption of the silver itself with its dissemination into the blood stream and results like those just mentioned. It is simply a somewhat slower method of introducing it into the system. Cleanse the skin thoroughly, smear the ointment freely over the surface, cover the area with oiled silk, and put over this, if comforting to the patient, a warm application to promote absorption. If the surface be not tender, the ointment may be rubbed in. In cases of puerperal sepsis it may be applied over the abdomen or to the inside of the thighs. In erysipelas it should be applied to the affected part. It makes very little difference what the exact nature of the infection is; one may rely upon it that the silver will be absorbed and will do good work. This is true, for instance, in such acute infections as endocarditis and meningitis.



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